THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXXI. No. 765.] LONDON, JANUARY 8, 1878. [30TH YEAR.] Price 6d.

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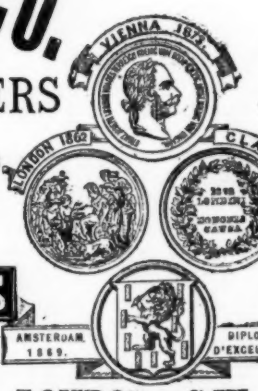

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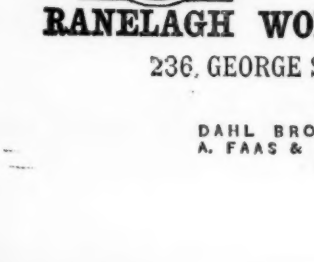

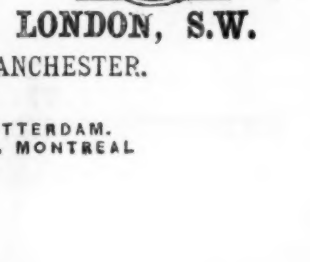

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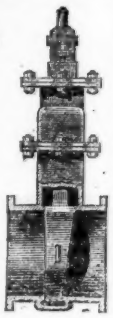

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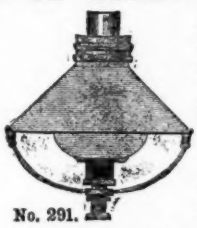

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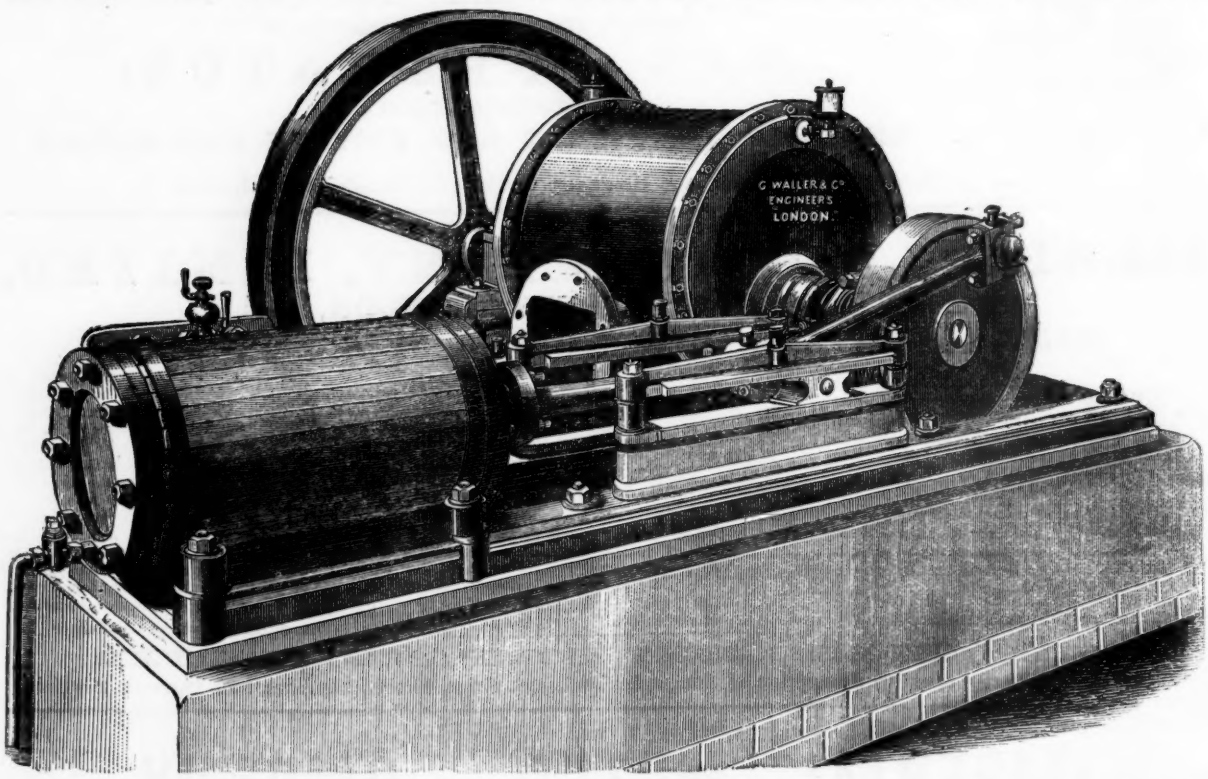

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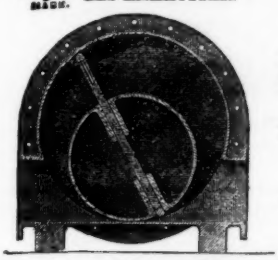

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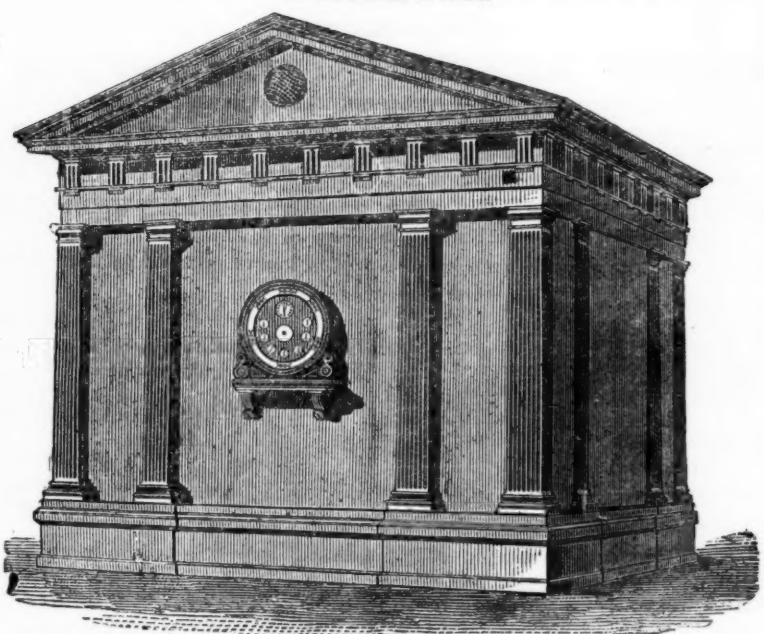

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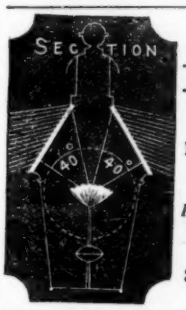

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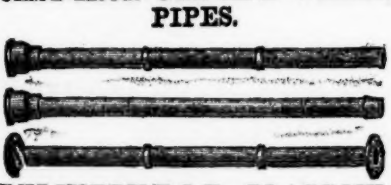
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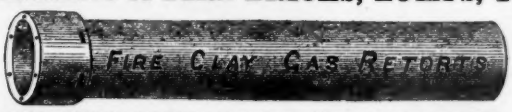

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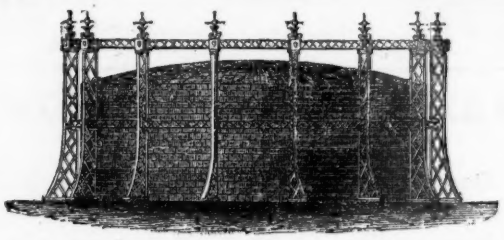
N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.



THE HORSELEY COMPANY,
LIMITED,
TIPTON, STAFFORDSHIRE.
LONDON OFFICE:
6, WESTMINSTER CHAMBERS, VICTORIA STREET,
GAS ENGINEERS, IRONFOUNDERS, &c.,
MANUFACTURERS OF
GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED LAMP-POSTS, PIPES,
AND ALL REQUISITES FOR EITHER
GAS OR WATER WORKS;
ALSO
MAKERS OF ROOFS, BRIDGES, &c.

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HYDRAULIC ENGINEERS,
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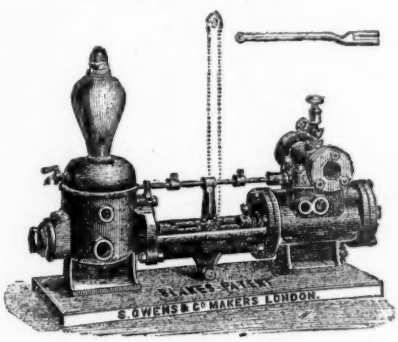
PUMPING MACHINERY of every Description.
SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF
BLAKE'S PATENT STEAM-PUMPS,
More than 10,000 in use,
ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.
The following are some of the prominent advantages of the BLAKE PUMP:—

It will start at any point of stroke.
It has no dead point.
It works fast or slow, with the same certainty of action.
It is economical. Has a lead on the slide-valve.
It is compact and durable.



It is interchangeable in all its working parts.
It will deliver more water than any other pump.
It is made of best materials in the most workmanlike manner.
Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

SOLE MANUFACTURERS OF
MANN & OWENS
IMPROVED PATENT GAS-VALVES.
PRICED LISTS AND FULL PARTICULARS FURNISHED ON APPLICATION.

TANGYE BROTHERS AND HOLMAN,

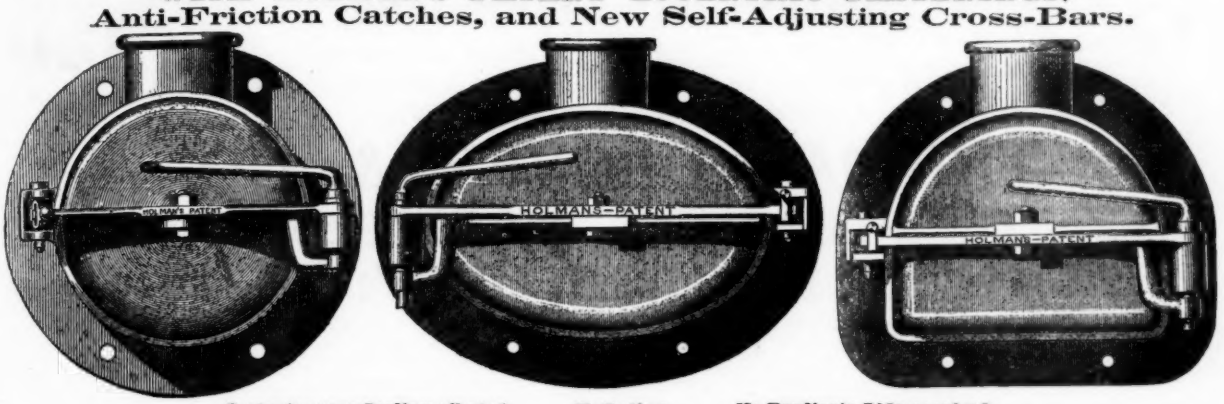
CORNWALL HOUSE, 35, VICTORIA ST., LONDON, E.C.

(LATE OF 10, LAURENCE POUNTNEY LANE.)

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.

Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, being now in use in nearly all the principal Gas-Works in London and the Provinces.

T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT (see Illustrations above), as well as bringing the Mouthpiece from the D or Oval at back to Circular in front, as heretofore.

D and Oval Morton's Lids are working satisfactorily both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland).

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

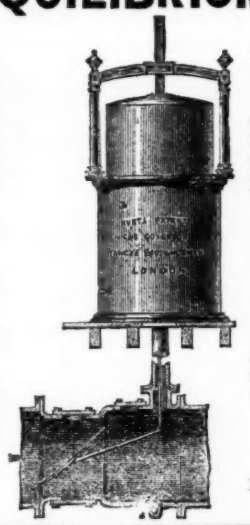
Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.



These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,

(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65

In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS; HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851 New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.

(ESTABLISHED 1816)

ARE THE ONLY MAKERS

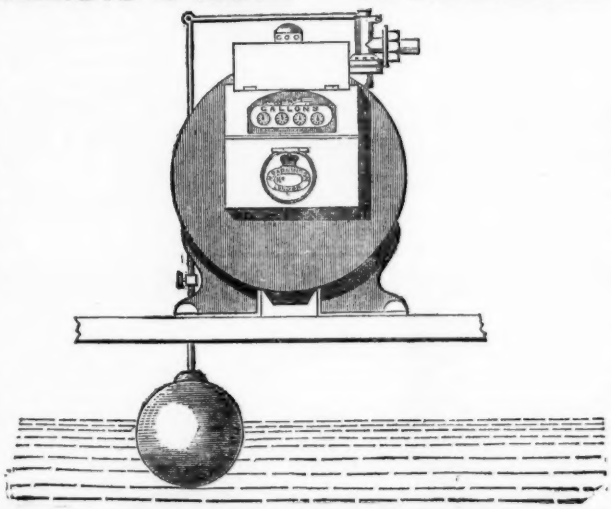
OF THE

LOW-PRESSURE WATER-METER.

These Meters will register with perfect accuracy, either at full speed, or with a few drops only passing through them.

They must be placed over the cistern to be supplied, and the water, after being measured, will fall from the outlet into the cistern below. Each Meter is fitted with a ball-valve, so made that it can be adjusted to shut off the supply at the inlet when the water reaches any required height in the cistern.

The 100-gallon Meter is fitted with a cistern holding about three or four gallons, and may be fixed inside a house, free from the effects of frost, and requires no attention after once being fixed.



From "The Engineer," April 6, 1877.

"Low-pressure Meters have been found to register with almost perfect accuracy, or, at all events, within 5 per cent. either for or against the consumer, and from the nature of their construction are by no means easily deranged. Still, even the low-pressure meters have their disadvantages, but these are chiefly as respects the question of first cost, seeing that they must have a cistern fixed at a higher level than that at which the supply is needed. All things considered, however, the balance of opinion rules at present in favour of the low-pressure Meter, and they are consequently increasing in favour as time goes on."

These Meters have been manufactured by W. P. & Co. for more than 25 years, and are largely used by the following and other Water Companies:—

NOTTINGHAM, DERBY, LEICESTER, SUNDERLAND, GREAT YARMOUTH, SHEFFIELD, NORWICH, LOWESTOFT, COVENTRY, SOUTHEND.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO SUBSCRIBERS.

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Subscribers who desire to avail themselves of the reduction in the subscription to the JOURNAL by paying in advance for the year 1878, are reminded that this can only be done during January.

Post Orders to be made payable at the Chief District Office, St. Martin's-le-Grand, London, to William B. King, 11 Bolt Court, Fleet Street, E.C.

Vol. XXX. (second half of 1877) will shortly be ready, bound in cloth, gilt letters, price 18s. Cloth cases for binding may be obtained on order from any bookseller, or from the Publisher.

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JANUARY 8, 1878.

Circular to Gas Companies.

THE City of London Gas Act, which first fixed an illuminating power of sixteen-candles for the gas supplied by the Chartered Gas Company, came into operation in September, 1868. Since that time the gas of the Company has been regularly tested, and the results published, and it must be an astonishing thing to most people that so few failures to comply strictly with the Act have occurred. As a rule, the gas supplied from every station of the Company is, at least, one candle above the statutory minimum; at one station it is very frequently two candles over. All this, however, goes for nothing with the Metropolitan Board of Works, who have seized, we cannot say the first opportunity (because small defaults have occurred before) of proceeding to recover the forfeiture incurred. We see, almost with regret, that the Company condescended to make an appeal *ad misericordiam*. They might have been certain that it would prove of no avail, though backed by a few earnest friends; consequently, the necessary proceedings took place at the Police Court, and the Company paid the fine, their representative, we need hardly say, looking as pleasant as ever.

The case may not be without its influence on future legislation. When it can be proved, by evidence in the possession of the Metropolitan Board, that the Chartered Company, for more than fifty-one weeks out of the fifty-two in the year, supply gas of much superior quality to that they are required to furnish; when it is known how ignorant we are of the conditions under which gas of a certain quality can be produced, and when we reflect on the possible variations of the standard of comparison, we confess to astonishment that the Metropolitan Board should have pushed this case to extremities. One thing we dare to assert, and that is, that every one concerned in the management of the Chartered Gas Company is earnestly desirous of fulfilling the requirements of the Acts of Parliament, especially as regards illuminating power. This is a matter on which, happily, no difference of opinion exists. We have here no squabble over purifying processes. The Company use the best coals that come to hand; and if a day's default occurs, the public may be assured that the Managers are innocent of any attempt to defraud. It must not be for a moment supposed that the Company gain a fraction of a farthing by these occasional defaults. Gas-works are conducted on a rough-and-ready principle; the same things are done regularly day by day from year's end to year's end, and the expenses of the Company are exactly the same. In our opinion only systematic violations of the statutes will justify prosecutions; and we hope that, in future enactments, nothing less than the average of a week's testings will be held to justify proceedings for forfeitures. The testings may or may not be a farce; but we contend that they should not be made the means of extortion. It does not matter, however. As most sagaciously remarked at the Metropolitan Board, consumers pay the fines, and, as the police-fund is benefited, ratepayers are relieved. It is just one of the little juggles for which our complex Legislature provides, and perhaps no one is the worse for it.

We have repeatedly said that the present mode of testing the illuminating power of gas is a very unsatisfactory process; but we look, unfortunately, in vain for indications of improvement. We have no more belief in oil lamps than we have in candles. If Messrs. Sugg and Kirkham could bring to perfection the self-registering apparatus they devised some years ago, they would render all gas manufacturers an important service. Two sources of error of much consequence would be eliminated, and we should have what may be called Nature's own record of the value of the gas. Of course, we make no reflection on present Examiners; we shall throw no doubt on their competency or conscientiousness; still we should be glad to have some other mode of examination than that now employed. If the majority of the members of the Metropolitan Board of Works had taken fairly into consideration the doubts suggested by our present mode of examining gas, they would have hesitated before they entered upon the recent prosecution. They have, however, achieved a small triumph, and Vestrydom may be grateful. It will be something for the present members to look upon with pride, when, having a popularly-elected Board, they sink into oblivion.

Mr. Clemenshaw is still unable to obtain a settlement of his claim on the Dublin Corporation. No money is forthcoming from any source. Promises are made, but it is hardly surprising they are not fulfilled. The Chamber of Commerce promise, the Gas Company promise in a qualified way, and members of the Corporation talk of making a contribution; but it is all talk, and the cash is still wanting. But Gas Engineers are not the only sufferers by the defaults of the Corporation, who have recently incurred further heavy expenses in the promotion of an Improvement Bill, and have once again failed to discharge their liabilities to their professional advisers and others. As a matter of course, we have a special sympathy with the Irish newspaper proprietors who have not been paid for inserted advertisements connected with this abortive scheme; but they have an opportunity of taking their revenge on the Corporation, which Mr. Clemenshaw and his fellow-sufferers have not.

It is not only in London that complaints are made as to the deficiency of illuminating power. At Ipswich it is reported that a small deficiency is the normal condition of things; while on Sundays the Company furnish but a "dim religious light," considerably unlike that required by the Company's Act. There can be no difficulty in maintaining a fourteen-candle standard with great regularity, and we are rather surprised to learn that the quality of the gas so often falls below that standard. There is, of course, a question as to the instruments employed to test the accuracy of the gas. Practically, after long experience, we have never found any serious defects to arise from this cause. It might be, however, though very unlikely, that inaccurate registration would give rise to small errors, and it would therefore be well to have the test-meter verified at stated intervals. The Ipswich Gas Act, we believe, requires a six-hours notice of the intention to test, and therefore the Company are without excuse when the gas falls below the standard.

Complaints are also made at Preston and Burton-on-Trent, the undertaking in the former town being in the hands of a Company, and the latter in the hands of the Local Authority. At Preston the question seems to be mainly one of an excess of impurities, but there are also complaints of deficiency of illuminating power. The standard in the town is eighteen candles, and according to the reports of the Borough Surveyor the gas is commonly of richer quality, the deficiency of illuminating power being ascribed to naphthaline, which chokes the pipes. These complaints, of course, give rise to a talk about purchase; but, for the moment, the Corporation are not disposed to move in the matter. Civilities are evidently not wanting on the part of the Company, and probably if a little pains were taken to instruct consumers in the adoption and use of the best consuming apparatus, complaints might altogether cease. But at Burton-on-Trent it would appear that the demand for gas has outgrown the means of supply—that is to say, that the capacity of the existing mains is insufficient to furnish, at a proper pressure, the amount of gas required. This is a common source of complaint, and Gas Companies and Local Authorities alike should look to the matter.

Notwithstanding what we said last week, we notice that the Town Council of Hastings have resolved on appointing a Committee, with the view of ascertaining the steps necessary to be taken by the Local Authority for the purpose of supplying the town with gas. If they are desirous to obtain the undertaking of the Company, they may perhaps acquire it for a fair consideration. If they are indulging any dreams of being able to set up competing works, we may candidly assure them their dream will never prove a reality. The Gas Company have served Hastings well. The works are a model, and, as we said last week, taking all the conditions into consideration, the price of gas is most reasonable. Parliament never have allowed, and, we venture to predict, never will permit a ruinous competition, at the expense of the Ratepayers, with a Company who can fairly show that they have always done their duty.

The Corporation of Worcester have renewed their contract with the Gas Company at last year's prices, and, although some dissatisfaction exists, we may take it that the general feeling of the Town Council is in favour of the Company. If any alteration be desired—and we cannot say that any such general desire exists—we would recommend the Council to adopt the average meter system, and take the lighting, extinguishing, and cleaning into their own hands. Public lights are rarely profitable to Gas Companies, and we have little doubt that the Company at Worcester would be glad to be relieved of the responsibilities attached to the management of them.

The Corporation of Rochdale having to a certain extent starved their gas undertaking, found it insufficient to furnish the supply demanded. They then cast about for the means of extending it, and had fixed upon a site for the erection of new works. But they never acquired the land necessary for the purpose, and now they have been judiciously advised by Mr. T. Newbigging, that additions to their present works will tide them over several years. Looking at the prospects of northern boroughs, and the desirability of as far as possible limiting their indebtedness, we strongly advise the Corporation of Rochdale to add to their present works, and not incur the debt which the erection of new works would involve. The times are critical, and we could not recommend any cotton town to increase its liabilities.

Quality of the Birmingham Gas.—Mr. Thomas Jackson, the Corporation Gas Inspector, reports that during the month of December last, at the four gas stations of the Corporation, he made sixteen examinations of the gas supplied to the borough for its illuminating value. The maximum light in sperm candles was 18·14; minimum, 16·14; average, 17·33. The parliamentary standard is 15 candles, with Sugg's No. 1 "London" burner. During the year 1877, at the four gas stations, there were 208 examinations made of the gas. The maximum light was 19·87 sperm candles; minimum, 16·06; average, 17·29.

Water and Sanitary Notes.

A judicious hint, given by the Home Secretary to the Metropolitan Board of Works, makes it tolerably certain that the ensuing session of Parliament will not be allowed to pass without legislation, having in view to prevent the disastrous floods which every now and then occur in South London. The Board know well the nature of the only measure which Parliament will sanction, and they must frame their measure in accordance with the principles which Parliament may be said to have laid down. We have argued the question so often, that we need now only re-assert the opinion, that the whole of the metropolitan area should contribute to the cost of the works necessary to prevent the incursion of the tidal floods into the low-lying districts of Southwark, Lambeth, and Fulham. That the frequently-recurring inundations have not driven the poor inhabitants of those districts from their dwellings is simply owing to the fact that their necessities compel them to remain in these habitations. The immense amount of discomfort they have endured ought to have softened the heart of every distant Vestryman; but we fear that nothing short of the hint given by the Home Secretary would have induced the Metropolitan Board to perform an obvious duty.

There seems to be, as we have remarked before, a pretty general *consensus* of opinion among the Metropolitan Vestries, so far as concerns the purchase of the existing water undertakings; but by no means the same as to the advisability of starting a dual supply. Let what will be said, the inhabitants of the Metropolis are, on the whole, and with sufficient reason, satisfied with their present water supply. They grumble at the price charged for it, as they would if it were one-half of what it is, but they know that they never want water except through their own carelessness and neglect, and common experience shows them that the quality of the water, denounced as it is, does them no harm. Under such circumstances no enthusiasm can be expected to prevail in the Metropolis respecting the proposals of the Metropolitan Board. They are certain, we think, to fall dead, and if by accident they should reach a second reading and a hearing before Committee, they are certain to fail. The hour has not yet arrived for the purchase of the Metropolitan Water Companies; the new scheme is totally unnecessary. Further developments of London may presently require fresh supplies of water, and since it may be accepted that the present supplies of water are nearly exhausted, the fresh supply must come from new springs. Putting aside, as altogether out of the question the acquisition of a Cumberland Lake, we must look to the chalk basin around London as the source of our future supply. But the Companies can resort to this source as well as any Municipal Corporation, and with far greater economy. If the time should ever come when every inhabitant of London will require a supply of more than twenty-three gallons a day, the Companies can give them the extra supply at the cheapest possible rate. We very much question whether the wisdom of Parliament will, under present circumstances, sanction two totally different supplies. What may be done, and what, if our Engineers will exert themselves, may possibly be accomplished, will be a mixed supply, in some respects purer, and at an increased pressure. This might involve no additional charge to the Metropolis, and, with proper districting arrangements, no discomfort to the inhabitants. In any case, the Metropolitan Water Question is a thing of the future. In some shape or other, it will last our time, and generations to come may be exercised over the aqueducts, the ruins of which the expected New Zealander will come to visit.

We rejoice to see that a certain amount of enthusiasm is springing up in support of Lord Camperdown's Bill. The shortcomings of the Metropolitan Board are pretty well known, though never made public. In these days the publication of disagreeable truths is a dangerous process, and, for our parts, wishing to lead a quiet life, we refrain from stirring dirty water. We wish to see the Metropolis, in its municipal associations, governed by gentlemen who intellectually and socially can adequately represent the wealth and intellect of the community. And what do we find? Let us drop a veil. Our readers can refer to a Directory or an Almanac, and see for themselves of what our two municipal bodies are constituted.

There are curious people in the world. The Local Board of Heywood went to Parliament last year in order to purchase the undertaking of the Water Company, in which they succeeded. The costs incurred appear to have amounted to £5232, and evidently some jealousy has sprung up, for one or two members of the Local Board are particularly anxious to know among whom this amount of money was divided. It seems to be tacitly admitted that Sir John Hawkshaw got the lion's share,

although he was *non est* when he was wanted in the committee-room. We can easily guess that the lawyers got the bulk of the rest. But then the small fry—the Members of the Local Board—came up, and had a private sitting-room, and, we suppose, dined sumptuously at the Westminster Hotel, with an *honorarium* of two guineas each a day. Moral for ratepayers: Every Purchase Bill must be paid for. It furnishes the opportunity for the jolliest holiday that a member of a Local Board ever had. *Verbum sap.*

Captain Calver's report has once more forced upon public notice the question of the possible utilization of London sewage, and all the old disputants, as far as we know, except Mr. Hope, have delivered themselves in newspaper correspondence on the subject. It is lamentable to see that we seem no nearer a solution of the question than we were twenty years ago. The formation of dangerous shoals, from the deposition of sewage mud, in the Thames, however, must presently lead to some alteration in the mode of disposing of metropolitan sewage. A possible change for the better is not, however, apparent. One thing seems certain; metropolitan refuse must be carried further and further down the river. Mr. Mechi still adheres to his notion that this refuse should be utilized by irrigation, but his ideas are perfectly chimerical. The vast volume of London sewage cannot be distributed by hose and jet over the most extensive area of land that could be placed at the disposal of the Metropolitan Board. Independent farmers, we venture to predict, would not think of buying sewage for more than six weeks in the year, and what is to be done with the stuff during the remaining forty-six? The only plan which, at the first blush, seems feasible to us, is a revival of the Maplin Sands scheme. It could not at once be remunerative, but, in the course of ten years, a considerable return might be expected. It would be a simpler plan to turn the sewage directly into the sea; but, little as is the value we put on diluted human excreta, we hesitate to countenance the waste, the like of which, as Baron Liebig showed years ago, must eventually end in the agricultural ruin of England. We are paying the penalty for the glorious invention of the water-carriage system. Perhaps we should not fare much better under an earth-carriage system; for a correspondent of *The Times*, who appears to have gone fully into the system, clearly shows that, in the earth-closets, the most valuable of the manurial constituents are rapidly oxidized, and almost completely disappear. The mineral constituents, of course, remain; but these are infinitesimal in quantity, and, although undoubtedly possessing a manurial value, have it but in small amount. It has been recently suggested that the earth-closet system might be applied to London; but we consider the application of this, or any other dry-carriage system, to be out of the question. We are condemned to the water-carriage system, and must do the best we can with it.

PROGRESS OF CHEMISTRY.*

First Notice.

Dr. Frankland's name is so intimately associated with the progress of chemistry during the last thirty or forty years, that this volume of his collected papers will be a welcome addition to the library of every chemist. To the section on "Pure Chemistry" we shall make no reference, although it will probably be considered to possess the greatest interest to scientific chemists. Premising that every line of the work has an interest, we turn to that part which deals with our special industry. Dr. Frankland has, in the course of his career, been extensively engaged with the manufacture of gas, with the practice of photometry, and the physical conditions which govern the illuminating power of gases. To all of these subjects he has brought all the exercise of an acute mind and careful experimentation. If we do not always agree with him in his conclusions, we may always admire the originality of the views, of the truth of which we are not convinced. On some points, however, Dr. Frankland perfectly convinces us. The gas supplied to the Metropolis in 1851, estimated by the illuminating value of its constituent components, was just as good as—perhaps a little better than—that supplied to-day; but the difference between the old iron burner and Sugg's New "London" Argand helps the gas to give an increased illuminating power of over 24 per cent. We fear the conclusion that Dr. Frankland has arrived at is but too true. The manufacture of gas has made no progress whatever since Murdoch put a shovelful of coals into his iron retort. Some mechanical inventions have tended to remove condensable impurities to some extent; but it has, we fear, to be confessed, that they have rather detracted from, than added to, the light-giving power of gas when consumed. Dr. Frankland, in his early days, had to investigate Stephen White's process for the production of what is known as "water gas," or the hydrocarbon process; and he has evidently a lingering expectation, which we share, that, in a modified form, like that proposed by Mr. Spice, a process of the kind may turn out of permanent value. But, apart from this, he was a good deal occupied with the ordinary process of manufacture and the composition of coal gas, and we here make no excuse for quoting largely from the introductory chapter, which leads up to the researches on gas. Referring to the paper of Mr. T. S. Humpidge, which we published in our columns (Vol. xxx., p. 380), he remarks:—

> These results show, firstly, that, notwithstanding the ostensible increase of illuminating power from 12 to 16 candles, in compliance with several Acts of Parliament, when the coal gas is consumed at the rate of 5 cubic feet per hour, the actual illuminating power has remained exactly the same; for the difference in 7·01 per cent. of olefiant gas, or its equivalent in other illuminating hydrocarbons, in 1851, and 7·02 per cent. in 1876, is too minute to be appreciable. The improvement of the coal gas sold in London has been only imaginary, for no real alteration has been effected. It has been made to appear better by testing it with improved burners; but, as consumed in the burners almost universally employed, it gives no more light in 1876 than it did in 1851—a conclusion which is confirmed by the results of simultaneous comparative trials made by Mr. Humpidge with two burners, one of them similar to those by which London coal gas was tested in 1851, and the other the so-called "Gas-Referees burner," at present employed in testing London coal gas. At 4 p.m. on the 6th of June, 1876, the gas supplied by the Chartered Company to the South Kensington Museum gave, when consumed at the rate of 5 cubic feet per hour from the 1851 [?] test-burner, a light equal to 11·1 standard candles, and on the 28th of June, at 3 p.m., a light equal to 10·5 standard candles; but when the same gas was tested at the same hours by the present Referees burner, it gave, when consumed at the same rate, a light equal to 14·3 candles on the 6th of June, and a light equal to 14·5 candles on the 28th of June.
>
> As regards cannel gas, the condition of London is far worse in 1876 than it was in 1851. Coal gas is not suitable for use in dwelling-houses, by reason of its very low illuminating power. One hundred cubic feet of coal gas contain only 4 cubic feet of illuminating gas, the rest is mere rubbish, which heats and pollutes the air in which the gas is consumed. Cannel gas contains from two to four times as much illuminating gas; and therefore its consumption affects the air of rooms to a far less extent, because a much smaller volume of it is required to produce a given amount of light. Now, in 1851 a large area of the West-end of London was supplied with cannel gas of such an illuminating power that a flame burning 5 cubic feet per hour gave a light varying from 27 to more than 30 standard candles. About two years ago the supply of cannel gas to private consumers was suddenly discontinued without their consent, and it has since been supplied only to the Houses of Parliament, and to some of the Government Offices. Its illuminating power is less than that of the cannel gas of 1851, still, when consumed at the rate of 5 cubic feet per hour, it sometimes gives a light equal to 27 standard candles.
>
> It cannot be too widely known that coal gas, though it costs less per 1000 cubic feet, is, light for light, much dearer than cannel gas. Thus, to give the light of 1000 cubic feet of cannel gas consumed from a bat's-wing or fishtail burner, and costing 6s., about 2000 cubic feet of coal gas, costing about 8s., would be required. The difference can, it is true, be diminished by the use for the coal gas of the elaborate and expensive burner employed for the official testing of the gas; but the consumer's burner is the fishtail or bat's-wing, costing 1d., and it can never be extensively replaced by the official burner, which costs 5s., and requires the use of a fragile glass chimney.

This statement is undoubtedly true, but our readers know that we have always advocated the use of gas of low illuminating and highly-heating properties, the reason for which must be apparent to every one. Taking the one point first, everybody knows that the use of two or three fishtail burners in a moderately-sized sitting-room enables the dwellers to dispense with the use of a fire. When the Western Company supplied their district with what Dr. Frankland calls 27-candle gas, the universal complaint was that it simply blackened the ceilings. We could mention first-class engineers who prayed for its discontinuance, in the belief that it only produced soot. There was, of course, a fallacy in this, for, if but a little pains had been taken in regulating its combustion, all the evils complained of might easily have been remedied. Our belief is that everybody but Dr. Frankland, resident in the Western Company's district, is heartily glad to be rid of cannel gas.

There is an especially interesting chapter on the Point of Ignition of Coal Gas, the experiments on which were originated by an explosion in Holborn, supposed to have been caused by the contact of an explosive mixture of coal gas and air with molten lead. The results are of singular interest to miners and gas manufacturers. It is not a novelty, but the difficulty of igniting marsh gas may well be remarked; but still more remarkable is the fact that the mixture of a small quantity of olefiant gas with gases and vapours having so low igniting points as carbonic oxide and bisulphide of carbon, enormously raises the inflaming point. We fear that much contained in this chapter has escaped recollection, and for this reason we here especially refer to it.

An interesting chapter is devoted to the description of a burner which Dr. Frankland devised for heating atmospheric air before it came into contact with coal gas in the process of inflammation, whereby the illuminating power of that gas was largely increased. The burner has almost passed out of recollection, but we entertain an expectation of seeing it revived some day in a new patent.

* "Experimental Researches in Pure, Applied, and Physical Chemistry." By E. Frankland, Ph.D. (Marburg), D.C.L., F.R.S., &c., &c. London: Van Voorst, 1877.

Kidsgrove Gas Company.—A new gasholder and tank have just been completed at the works of this Company, at Harding's Wood. The six massive columns and lattice girders have a very noble appearance, and the work throughout is exceedingly well designed. The holder, which is 50 feet in diameter and 16 feet deep (made to telescope), and the whole of the ironwork, which is of the best material and workmanship, and does great credit to the contractor, was made and erected by Mr. George Barker, Union Foundry, Kidsgrove. The plans and specifications were prepared by the Company's Manager, Mr. J. Davies, and the whole of the works, which were commenced last April, have been carried out entirely under his directions, and, as now appears, to a very satisfactory result. Very serious difficulties had to be overcome during the progress of the work, owing to the proximity of the buildings and the other tanks.—*Staffordshire Sentinel.*

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

CLIV.

District Governors (*continued*).

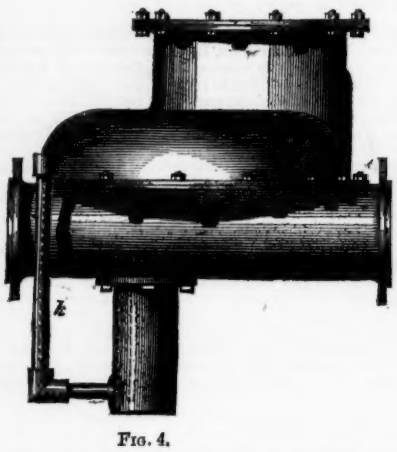

Fig. 4.

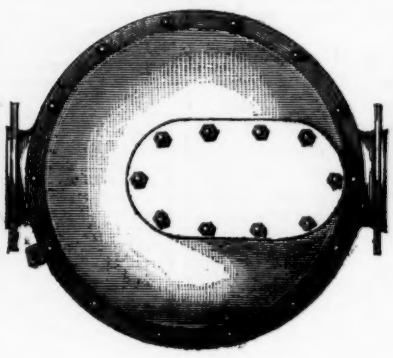

Fig. 5.

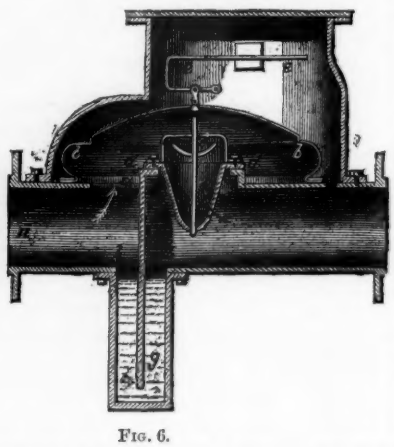

Fig. 6.

The district governor of Mr. E. S. Cathels is shown in elevation, plan, and section in figs. 4, 5, and 6. The principle of its construction is exactly that of a reversal of the ordinary station governor; the usual outlet being made the inlet, *a*, and *vice versâ*. The inlet pressure thus exerts its force freely under the diaphragm, *b*. The cone, *c*, is suspended above instead of under the opening, or seat, *d*, and its apex is turned downwards, so that instead of its being drawn up into its seat and reducing the gas-way by the increased pressure, as in the ordinary governor, it is lifted out of its seat, enlarging the passage for the gas, and so increasing the outlet pressure; again falling, and diminishing such pressure in proportion as that at the inlet is reduced.

The space, *e*, above the diaphragm is air-tight, and is in connection with the outlet by means of the opening or vent, *f*, so that it is impossible for the cover to fall and stop the gas-way, however sudden or great the draught on the outlet may be; because the draught will affect such space to the same extent as the main, and the downward or closing pressure on the diaphragm being removed to the same extent as the inlet or upward pressure, the gas-way remains as before.

The diaphragm, *b*, is a metallic plate with a leather hinge. The adjustment to any desired pressure is made by the counterpoise weight on the lever, and, when once fixed, the apparatus is entirely self-acting, the outlet pressure being the governing power. When the governor is fixed, the seal-box, *g*, is filled with water through the filling-pipe, *k* (fig. 4), any fluid accumulations in the main passing through the holes, *h h*, from the upper to the lower side of the partition.

The governors are fixed in the line of main in which the pressure is to be reduced, at such distances apart as may be considered necessary; the closer they are together, the better, of course, will the pressure be controlled. Generally speaking, one governor at each 50 feet difference in elevation may be adopted.

The differential gas-governor of Messrs. J. and J. Braddock is shown in fig. 7. Like some of those already illustrated, it is attached in position without deviating from the line of main at the point where it is placed. It consists of a shallow cast-iron box containing the governing bell, and covered with a strong lid, the centre part, A, of which is removable for the purpose of periodical examination and adjustment with the lead weights or washers, B, placed on the crown of the bell. C is a tube for supplying the governor with water when required, which overflows by the tube, D, into the seal-cup, E, the surplus water passing off down the main to the nearest syphon-well. The tube, D, also acts as a means of supplying the inside of the bell with a pressure of gas equal to the inlet pressure, the pipe, F, acting in the same manner for the outlet pressure into the chamber above the bell, so as to enable the one to counteract the other. The governor shown is for a 6-inch main, and the space it occupies above the pipe is only about 12 inches. The principle is that of Mr. Cathels's governor, but a water-seal is adopted instead of the hinged diaphragm.

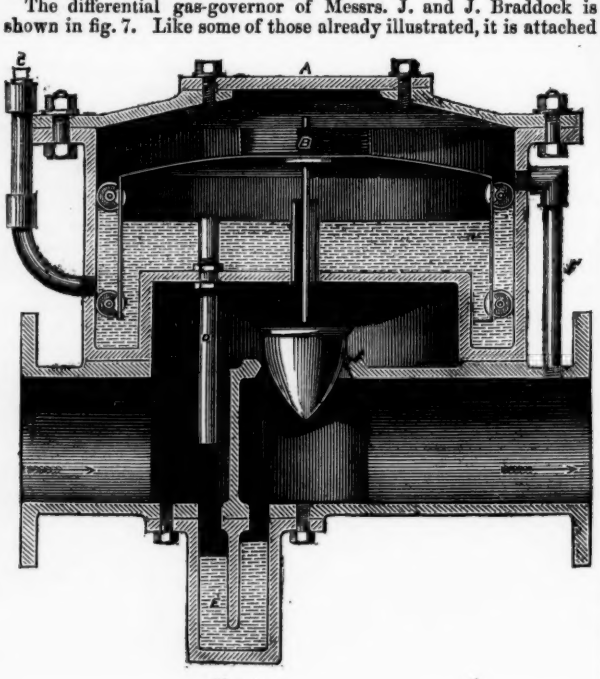

Fig. 7.

The apparatus illustrated in fig. 8 is the district governor of Mr. D. Bruce Peebles, and it presents various features of an interesting

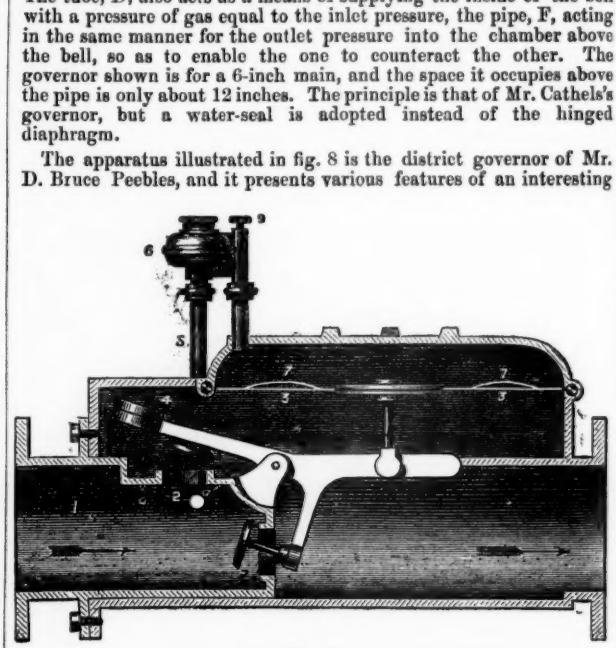

Fig. 8.

and novel kind. The outer case is of cast iron; it occupies but little space, and is fixed on the direct line of the main. The gas entering by the inlet (1) in the direction of the arrows, passes through the valve openings (2), and presses upon the underside of the flexible diaphragm (3), which is connected by a vertical rod to the lever actuating the valves. This force tends, in conjunction with the weight (4) on the end of the lever, to close the valves; but the inlet gas passing through the pipe (5) to the upper side of the diaphragm (7), induces a contrary action, tending to open the valves. On the top of the vertical pipe (5), however, a small governor (6) is fixed, and this can be adjusted to give any desired pressure. Alongside of the small governor is a screw-valve (9), employed to establish the minimum day pressure. The method of adjustment is as follows:—When the day pressure is on at the works, the district day pressure is established by keeping the valve of the small governor entirely open and out of action, and moving the screw-valve until the required day pressure is obtained. The night pressure is then put on at the works, and the small governor adjusted to give the desired night pressure in the district, which is done by weights inserted through the orifice at the top, the screw cap being removed for that purpose. This pressure cannot then be exceeded unless an alteration is made in the weighting of the small governor. The maximum and minimum pressures are thus both under command, and the apparatus being automatic, requires no attention after being once set.

(*To be continued.*)

LIGHTING BY ELECTRICITY.

(*Continued from Vol.* xxx., *page* 984.)

We have, so far, been considering what can be done with electricity when employed in an electric lamp of the most improved principles; and, for reasons that will appear in the sequel, we shall now make a few remarks respecting the important part that that portion of the lamp plays called the regulator. The efficiency of the lamp is, without doubt, due to the beautifully automatic machinery within its base, and the name of the inventor of this so-called "clockwork" attaches to the lamp, and becomes the name by which it is known. As there are, at least, half a dozen inventors, so we have as many different sorts of lamps, all of which are, more or less, approved of. The lamp we have illustrated* is the invention of M. Hafner-Alteneck, and is constructed by MM. Siemens and Halske, of Berlin. As it is *said* to be efficient it was selected, for the purpose of showing what the regulator of a lamp has to contend with, in preference to those of other inventors of repute that are more complex. We do not, in this place, pretend to judge of the merits of such apparatus in connection with the work for which it is designed; and, at the same time, we desire to avoid being accused of selecting a lamp with a regulator of a more formidable aspect.

When the light is going, the demand on the regulator is incessant, and the adjustment so minute that nothing but well-contrived and carefully-constructed machinery can in any way cope with the requirements. There is the dispersion of the carbons, which every moment tends to widen the space that the light occupies, and which would in a few moments become too great for the "voltaic arc" to overspan if it were not for the vigilance of this train of wheels, the result being that the light would be lost. Again, there is the varying density of the carbon. This is a source of disturbance that requires compensating, as also do the fluctuations that take place in the current, due to the variations in the speed of the machines producing it. Should a carbon split, and a piece fly off, immediate and very active service is demanded of the regulator, to save the light; or, if lost, to reproduce it in a short space of time, by bringing together the carbons in such a manner as not to do further injury to their ends by abrupt contact. All these incidents, and more, the regulators have to take account of; we need not, therefore, wonder at the display of the clockmaker's art that is found in these lamps, nor be surprised that the complete apparatus occupies a considerable space. If, instead of all this contrariety, we could secure certainty of action, by obtaining carbons of such a nature that their dispersion would be constant, provided the electric force were equable, and that this condition of current also could be obtained, a very different state of things would prevail. We should then have only to keep the carbons at the distance which was found to give the maximum light, and to maintain them in that position. This would be easily done by allowing the carbons to approach each other at the rate at which they decreased in length for any given period; but, at present, this is an impossibility. Hence the necessity for providing each lamp with an elaborate piece of mechanism, called the "regulator," in order to correct, or, rather, eliminate the effects of the disturbing causes just mentioned.

There is also the inconvenience of having to replace the carbons every three or four hours, even when the lamps used are of large dimensions. For this no remedy has, as yet, been devised; but, knowing that inventors are turning their attention to the subject, we give an illustration and description of an invention which shows the first departure from the beaten track, and which has led to other contrivances having in view the remedying, if possible, of the last-named difficulty, and also the maintenance of the distance of the carbon points so as to fully develop the light.

In the case referred to, instead of employing carbon crayons placed end to end, which shortened every moment while the light was going, and, therefore, required perpetual re-adjustment for distance, by some means or other, not then automatic, the inventor employs discs of carbon, distanced, after first contact, by hand, to the extent necessary for giving full effect to the electric current at his command. These discs are to be revolved by "clockwork." This would cause fresh surfaces to become adjacent every moment, and thus the required space for the full development of the light of which the battery power is capable, is kept by a sort of adjection, rather than, as now, by adjustment. This will continue to be the case until the discs have made a complete revolution; what takes place after this we are not told.

The inventor, Mr. Thomas Wright, thus describes his invention in the specification of his patent, dated March 10, 1845, and from which the annexed drawings, figs. 8 and 9, are copied:—

A is a double annular frame of wood, or other non-conductor of electricity, between which are placed five (or other number of) discs, B^1, B^2, B^3, B^4, B^5, mounted upon axes revolving in bearings attached to the frame, A. These discs consist of two circular plates of brass or other metal, between which are placed circular discs of plumbago or carbon (the latter being preferred), about a quarter of an inch in thickness, and somewhat larger in diameter than the containing metal plates, having angular or V-shaped edges. The discs, B^1, B^3, B^5, are mounted in bearings affixed to the frame, A, but the discs, B^2, B^4, are mounted in sliding carriages capable of being advanced forward or drawn backward by means of the adjusting screws, C^1, C^2. These discs are set in motion by means of a band passing round pulleys on their axes, and connected with wheelwork actuated by a weight or other prime mover, so as to cause the several discs to revolve with a slow uniform motion. On passing a current of electricity through the whole series of discs while they are rotating, a brilliant light is produced at the edges of the discs that are adjacent to each other. This may be accomplished by connecting one wire of a galvanic battery with the axis of the disc, B^1, and the opposite wire with the axis of the disc, B^3; but, in order to economize the power, I prefer to separate my battery into four parts, and transmit a separate and distinct current to each pair of discs, as shown in the drawing. In order to bring about the desired effect,

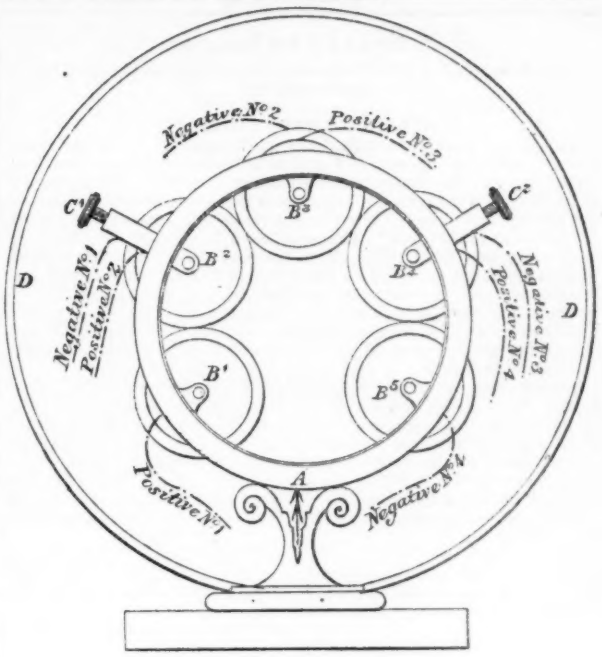

FIG. 8.

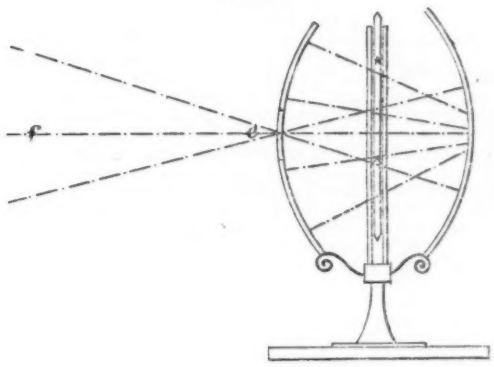

FIG. 9.

the discs, B^2 and B^4, are to be brought in contact with the adjacent discs, B^1, B^3, B^5; and as soon as the electric current is established, and the points of contact sufficiently ignited, the discs, B^2 and B^4, are to be withdrawn out of contact, when a brilliant and permanent light will continue to be evolved at the several proximate portions of the discs, so long as the electric current passes and the discs continue to revolve. For the equable diffusion of the electric light thus obtained, I enclose the apparatus hereinbefore described within a globe of ground glass, as shown at D; or if the whole of the light is required to be thrown in one particular direction, I employ a suitable arrangement of reflectors, one of which is shown at fig. 9, whereby the whole of the light is thrown in the direction, *e*, *f*.

Thirty-two years afterwards—*i.e.*, on May 16, 1877, Provisional Protection was obtained by Mr. F. W. Heinke, for "Improvements in the method of and apparatus for obtaining or producing electric light." The inventor makes no pretensions to improvements other than the getting rid of the regulator of the electric lamp, as now in use, and the necessity for replacing the carbons at such short intervals, as is the case at the present time; but still his lamp is as much encumbered with "clockwork" mechanism as anything of the present day, which the following extracts will abundantly prove:—

In carrying my invention into effect, I provide carbon discs or electrodes, which are caused to rotate in contrary directions, and to work against one another, preferably at right angles, or nearly so, to one another; for this purpose I mount one disc on an axis, to which rotary motion is imparted by clockwork, or in any other convenient way. Supposing this disc to be set to revolve in a horizontal direction, I provide another carbon disc, placed in a vertical direction upon an axis, which is also caused to revolve by clockwork mechanism; the two discs I prefer should revolve synchronously, but they may revolve, if desired, at different speeds. For this purpose I provide a train of wheels suitably arranged for that purpose; the two carbon surfaces thus revolving, a separate and distinct surface of carbon is successively and continuously exposed to the action of the current of electricity. . . . To provide for the wear of the discs, one of them during its revolution is brought up to the other a regulated distance, at, say, each complete rotation of the discs, and this is accomplished by connecting the frame carrying its axis with the train of wheels and clockwork mechanism aforesaid. . . . The edges of the carbon disc or electrode are preserved during their rotation with suitable edge by providing metal or composition sharpening appliances, between or through which they pass, and thus the discs are set at each rotation thereof. . . . The speed at which the discs rotate varies according to circumstances. . . . When bars or rods are used instead of discs, I cause them to have a reciprocating motion, and provide adjusting and sharpening arrangements as before.

(*To be continued.*)

* JOURNAL, Vol. xxx., page 908.

SALE OF GAS SHARES.—At a sale by auction on the 27th ult., three £10 ten per cent. shares in the Kidsgrove Gas Company sold for £62.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

PORTLAND CEMENT CONCRETE.

SIR,—I am anxious to defend the good name of one of the most valuable—for many purposes *the* most valuable—of all our building materials—viz., Portland cement concrete. In your last issue, on p. 19, there is a reference to my concrete tank, from which the writer, Mr. Chatto, draws the "conclusion that tanks built entirely of concrete are not to be relied upon." This conclusion is not now correct. The tank, when first filled, did leak at the rate stated; but this rate of leakage gradually decreased in the course of twelve months, until the 6 inches in depth of water that was lost daily at first was reduced to less than 2 inches. A diver was then employed, who succeeded in completely stopping the leakage. This was done in December, 1876, and during the greater part of last year there was an overflow of rain-water from the tank.

I would, moreover, point out that, had the tank been made water-tight with puddle, as is usual with brick tanks, there would have been no cracks, but depending as it did for soundness entirely on a thin skin of cement rendering, it was altogether an exceptional work, and as such no comparison can be made with brickwork made tight by puddle.

I am very glad it did leak, for two reasons. In the first place, the cause of weakness has been discovered; and in the second place, it is now known that any cracks that may occur in a tank of this description can be stopped.

I am so satisfied of the superiority of this description of tank, that in any future tanks I may be called upon to construct I shall follow this plan, unless the ground consists of clay, in which case I should use concrete, and dispense with the rendering.

GEORGE LIVESEY.

South Metropolitan Gaslight and Coke Company, 589, Old Kent Road, S.E., Jan. 5, 1878.

CORRECTIONS.

SIR,—There is a misprint in p. 12 of the JOURNAL of Jan. 1: "Such leakage being in the proportion of the square root of the pressure," instead of "in the *inverse* proportion" or "inversely as."

You will, perhaps, think me an ultra-purist if I also object to the expression in the first paragraph of the article: "The *pressure* of the gas in the mains varies," &c. Of course, what is meant is "the pressure as read off from the gauge which is in communication with the atmosphere." But accuracy of language is one of the lessons which science may be expected to teach and insist on.

I ought not, however, to presume to offer so minute and, as most practical men will say, trifling a criticism, without at least suggesting a correction; so I venture to propose: "What is technically or practically called the pressure of the gas, as indicated, at any point of its course, by the pressure-gauge, varies," &c., instead of the words, "The pressure of the gas *in the mains* varies," &c.; for, although the matter is afterwards thoroughly explained, yet, in my opinion, it is better to avoid a directly inaccurate expression. And this objection impressed itself on me at once as I read the first paragraph, without looking further.

Will you also pardon me if I call attention to the want of typical precision in the formula for paraffin in the first column of the same page? Instead of C_nH_{2n+2}, it should, of course, be C_nH_{2n+2}. The same typical inaccuracies occur in the formulæ quoted from Dr. Mills's work, in the preceding page.

ROBT. PHELPS.

Sidney Sussex College, Cambridge, Jan. 3, 1878.

Legal Intelligence.

WORSHIP STREET POLICE COURT.—SATURDAY, JAN. 5.

(Before Mr. BUSHBY.)

METROPOLITAN BOARD OF WORKS *v.* THE GASLIGHT AND COKE COMPANY.

In this case The Gaslight and Coke Company were sued by the Metropolitan Board, under section 50 of their Act, 1876, to recover penalties for supplying gas from their Shoreditch works, on the 11th ult., of less illuminating power than 16 candles, as prescribed by section 25 of the said Act.

Mr. FRY (from the office of the Solicitor to the Board) attended to prosecute, and Mr. BEDFORD (of the firm of Curtis and Bedford) appeared for the Company.

The MAGISTRATE (on taking his seat on the bench) said: I would suggest to the parties in this case that the hearing had better be adjourned until Tuesday or Wednesday next, when Mr. Hannay will be sitting here. I have been so recently connected with this Company that I think it very desirable I should not try the case. I would ask those who represent the parties whether Tuesday or Wednesday would suit them best.

Mr. FRY: I am afraid, sir, that we must go on with it. The 54th section of the Act says, "The forfeiture shall be leviable by distress, and on proof of any such report before two justices or a magistrate at any time within one month after the date of the report, such justices or magistrate shall issue their or his warrant of distress accordingly." The month in this case expires on the 11th inst. What I should propose is that I should tender formal proof of the report now, then there will be no difficulty.

The MAGISTRATE: What section are you quoting?

Mr. FRY: The 54th—the last part of it.

The MAGISTRATE: The report has to be proved?

Mr. FRY: Yes.

Mr. BEDFORD: I think I can save you trouble.

Mr. FRY: I am prepared with proof of the report. But let me say this: I understand that the other side do not intend to defend the case, so that if I put in my formal proof I shall ask for your order.

Mr. BEDFORD: We do not wish for an adjournment, because we do not contest the matter.

The MAGISTRATE: Very well.

Mr. FRY: Sir, these proceedings are taken by the Metropolitan Board of Works, who are the Local Authority under The Gaslight and Coke Company's Act, for the purpose of asking your warrant of distress against them for forfeitures which they have incurred under section 50 of that Act, which I now put before you. I think it will be convenient if I at once read that section. It is sec. 50 of the 39 & 40 Vict., c. 225, and it is in these words: "If on any day the gas supplied by the Company from any station is of less illuminating power than it ought to be under this Act, the Company shall be liable to the following forfeitures:—For the first half of a candle of defective power, forty shillings." That does not affect this particular application. The next paragraph does: "For the first and every subsequent candle of defective power, a sum equal to the value of the defective power, estimated at the rate of twenty shillings for every half candle of defective power on every one hundred thousand cubic feet, or any fractional part less than one hundred thousand cubic feet of gas, whether common gas or cannel gas respectively, delivered from that station on the day of default." Now, sir, I have here the certificate of a gentleman of very great experience in these matters, who has seen the books of the Company, and ascertained what that amounts to. But perhaps it will be convenient if I now refer you to the sections which bear upon the case, so as to show you precisely how these proceedings have arisen. Sir, if you refer first of all to section 38 you will find provision for the appointment of Gas Examiners. I am prepared to produce formal proof of the appointment of the gentleman by whom the examination of the gas complained of was made. Then the next section makes provision for the appointment of a Chief Gas Examiner, and section 40 relates to the daily testing of the gas. It says: "A Gas Examiner shall at each testing-place make daily such number of tests as the Gas Referees may prescribe for ascertaining whether during the whole of each day the illuminating power, purity, and pressure of the gas supplied by the Company are such as are respectively prescribed under this Act, and in the event of the same being ascertained to be defective in any particular, he shall forthwith give notice thereof to the Company." Now, sir, on the 11th of December last the Gas Examiner at the Graham Road testing station examined the gas supplied by the Company, and found that instead of the gas giving an illuminating power of 16 candles it had only an illuminating power of 14·7 candles, so that there had been a falling off of more than one candle, and I am asking now for the forfeiture in respect of that one candle, as fixed by section 50 of the Act to which I have already drawn your attention. You will see that section 49 has reference to the register of the gas made by the Company, and requires them to afford access thereto, at all reasonable times, to the Board, and I may say that the Company have afforded every facility for the gentleman who attended at their works yesterday, and they produced their books for his examination. The penalty, you will have observed, is fixed at 40s. for every candle of deficiency upon each 100,000 cubic feet, and, taking the fact that on the 11th of December last 3,654,000 cubic feet of gas were made at the station of the Company at Shoreditch, he has calculated, according to the method pointed out in the section, that the forfeiture to which they are liable amounts in round numbers to £74. That is the amount of forfeiture the Company have incurred, and for which I ask your warrant. Then you will see that section 45 of the Act provides for an appeal to the Chief Gas Examiner, "If the Company think themselves aggrieved by any report of a Gas Examiner, they may within seven days after the day on which that report is delivered to the Company appeal to the Chief Gas Examiner, whose decision, after hearing the parties, shall be final and conclusive, and the Chief Gas Examiner shall report every such decision to the Corporation and the Metropolitan Board." I should mention that there has been an appeal, but it has been without any result. I have here the Chief Gas Examiner's report, which I shall produce before you. Section 47 says, "If in any case the Company do not appeal as aforesaid, the report of the Gas Examiner shall be final and conclusive." What I shall rely upon, therefore, is the report of the Gas Examiner for the day in question, showing that there was a deficiency of illuminating power. Section 49 provides that the Company shall keep a register of the gas made at each station, and that is the one to which I have referred. I have also referred to section 54, which relates to evidence of liability to forfeiture, and states that, on proof of the Gas Examiner's report before two Justices or a Magistrate within a month, a warrant of distress for the amount of the forfeiture shall issue. What I propose to do is—first of all to call a gentleman from the Board of Trade, who will produce the original appointment of the Gas Referees; then I shall produce the certificate of the Gas Examiner, which I shall rely upon as showing the deficiency of illuminating power, as I have described, and then I shall put in the formal appointment of the Gas Examiner who made this report. But I am told the Company admit all this.

The MAGISTRATE: It seems extraordinary that you should have to prove the appointment of these officers.

Mr. BEDFORD: We do not require it at all; it is wasting your time.

The MAGISTRATE: If you wish to do it you can do it.

Mr. FRY: I am only trying to follow out the course adopted by the City Solicitor in a case which was heard seven years ago at the Mansion House.

Mr. BEDFORD: That was a case which we contested.

Mr. FRY: I am entirely in your hands.

The MAGISTRATE: There can be no admission of guilt in a criminal case, but with reference to the appointment of officers, unless it is contested it is not necessary to prove it. If a gentleman gets into the box and says, "I am the Chief Gas Examiner," it is conclusive unless it is questioned in cross-examination.

Mr. FRY: It was only because the section to which I have referred says, "On proof of any such report."

The MAGISTRATE: Yes; proof of report.

Mr. FRY: Then I will simplify it very much by calling the Gas Examiner at once.

The MAGISTRATE: Unless they cross-examine the witness in the box.

Mr. BEDFORD: In the case at the Mansion House seven years ago we did strongly contest everything. We do not do so now, and we do not wish to take up your time.

Mr. *Henry Leicester Greville* was then called. He said I am the Gas Examiner appointed by the Metropolitan Board of Works for the district of Shoreditch. I hold in my hands a certificate of the illuminating power of the gas made at the Shoreditch works of the Company on the 11th of December. The examination was made at the Graham Road testing station. The tests were made in the manner prescribed by the Instructions of the Gas Referees. There were three tests. The result was that, during all the hours of testing on that day, the illuminating power was 14·7, or rather more than 14½ candles—*i.e.*, rather more than one candle short of the standard. The report I have here is the original report.

Mr. FRY: I shall now call Mr. Keates to show the quantity of gas made at that station on the day in question, so that you may be able to arrive at the amount of forfeiture.

Mr. *T. W. Keates:* I am Consulting Chemist to the Metropolitan Board of Works and their Chief Gas Examiner. I was instructed to apply to the Company to examine their register of the gas made at these works on the 11th of December last. I attended at the office yesterday and examined the ledger accordingly. I found that on that day they delivered 3,654,000 cubic feet of gas. That properly calculated out in hundreds of thousands will give about 36½—virtually 37—quantities of 100,000 cubic feet each. The penalty, therefore, being 40s. for each 100,000, the whole amount of forfeiture is £74.

The MAGISTRATE: And that is not contested.

Mr. BEDFORD: No. I have nothing to ask Mr. Keates.

Mr. FRY: I may just add that though there is no wish on the part of the Board to press severely on the Company, I am afraid I must ask you for the full amount of the forfeiture. I think you cannot mitigate it.

The MAGISTRATE: So it appears.

Mr. FRY: It is not the object of the Boa[illegible]to persecute the Company; their only desire is to look after the inte[illegible]s of the public. They are the Local Authority to which Parliament [illegible]e confided this duty. There was another prosecution recently instituted by them against the Commercial Gas Company, not for a similar offence, but for another offence under a Gas Act, and the Board felt then that they had no alternative but to take those proceedings to show that they were doing their best to fulfil the duty which has been cast upon them by the Legislature. That being so, of course, they find that in the present instance they cannot make any exemption in the case of one company more than another, and it seemed to them a matter of duty to bring the matter before the Bench and leave it, sir, in your hands.

Mr. BEDFORD: As I before said, my clients do not contest these proceedings. They admit their liability, and they admit also the amount of the penalty incurred—viz., £74. I am afraid it is a fact that, under the Act cited, you, sir, have no option, and cannot remit any portion of that penalty. We therefore consent to it as far as that part of the case goes. But I think it is only fair to my clients, The Gaslight and Coke Company, that I should say a very few words as to the cause of these proceedings. I do not complain of the Metropolitan Board of Works for having taken out this summons, although I am glad to see, from the reports in the daily papers, that there was a considerable division at the Board yesterday as to the advisability of carrying the proceedings any further. At the same time, we feel that the Board are only doing what they conceive to be right in the interests of the public, and, therefore, though we were in hope they would not have carried the matter further, we do not complain of the course they have adopted. But, sir, I desire to show you how anxious the Company are to fulfil the obligations which the Act of Parliament imposes upon them. You will have observed, in looking over the Act, that the standard of illuminating power for the gas supplied by the Company is 16 candles; and I think I may safely state that for the last seven years and upwards the reports of the Gas Examiners will show that the public have been supplied by the Company with gas of 17, 17½, and even 18-candle power. We received no extra price for that additional value, and I may almost say that we have received no gratitude for it. I see by the reports of the Superintendent of the station in respect of which these proceedings have been taken, that during the last year the illuminating power of the gas was as follows:—January, 17·3 candles; February, 17·7; March, 18·3; April, 18·2; May, 17·9; June, 18·1; July, 17·9; August, 17·6; September (which is the lowest of all), 16·8; October, 17·4; November, 17·2; and December, 17·0; giving an average of 17·61, or more than 17½ candles as the illuminating power of the gas supplied from that station to the public during the whole of 1877; the obligation upon us, under our Act, being only 16 candles. I am told also that during the past year there was sent out from this station alone 762 million cubic feet of gas of the high average illuminating power I have mentioned. I only state these things in fairness to the Company, and in order that the public, who sometimes give Gas Companies rather hard rubs, and seem to think they do not always get what they pay for, may know the real facts. And as it may appear in the papers that my clients are now charged with supplying gas of less illuminating power than is required by their Act, I think the other side of the case should be put forward, and that it should be known that for seven years there has not been a single prosecution for deficiency of illuminating power, nor for any default in the purity of our gas, until this unfortunate circumstance arose which has brought us here to-day. I should also state that, though we do not in any way contest these proceedings, it is very curious how this fault has arisen. It is one which completely puzzles all the officials of the Company. I dare say, sir, that you are perhaps aware that in addition to the official testing-station, the Company, under their Act, have power to maintain a testing-station of their own upon the works, and to conduct their own tests. Such a provision exists at the Shoreditch works, and, curiously enough, the testings of gas there taken, on the very day on which at the official station the tests showed an illuminating power of only 14·7 candles, gave a record of 16·2 candles. One would have thought also that the public, who are so apt to grumble at the Companies, would on that occasion have made numerous complaints of defective illuminating power; but, curiously enough, we did not have a single complaint from any of our customers. I can only conceive, therefore, that, from some cause which has not been discovered, this deficiency must have been localized, and that the gas which passed through the main to the official testing-station did not pass on to the general public. It is some satisfaction to the Company to know that, though they have incurred a legal forfeiture of £74, they have not broken faith with the public, who have been supplied with the same good gas as before. These facts were laid before the Metropolitan Board of Works, and I should have thought, under the circumstances, that they would not have taken these severe proceedings under the rather stringent penalty clauses of the Act. I do not know that I need trouble you further, but I thought you would feel it right that this side of the case should be put before you, and that it should be shown that the Company do deal liberally with their consumers, giving them generally gas which is from 1 to 1½ candle higher illuminating power than they are required to give by the statute. I would only add that, such being the case, we much regret being brought here to-day. It does seem rather hard that when a Company have supplied a considerably higher quality of gas than they are obliged to do for a period of seven years, for which additional service they get no credit or benefit, yet the moment that for 24 hours the gas drops below the standard they are mulct in the heavy penalty of £74. We, of course, cannot prevent that. We did the best we could to get an average clause inserted in the Act, but we did not succeed, and must therefore be content to pay the penalty.

The MAGISTRATE: I should not, of course, make any remark upon the interesting statement which Mr. Bedford has made, and I am the more careful not to do it as I have been so recently connected with the Company. My duty on this occasion is simply executive; I have only to issue my warrant for the £74.

Mr. FRY: I do not know whether I should say anything about the costs. I may state that the whole of the £74 goes to the Receiver of the Metropolitan Police, and I think it is only fair that the Metropolitan Board should be recouped for their expenses. I would only ask for ten guineas, or something like that, as costs.

The MAGISTRATE: We are not in the habit of giving costs here. If there has been anything like a factious opposition to a legal claim, then sometimes costs are allowed; or, again, in such a case as this, if the party had offered an opposition to the inquiry, it might be done. But here the Gas Company have offered no obstacle, and do not raise any factious opposition.

Mr. FRY: At the same time the Board have been put to ten guineas costs, for money out of pocket, and it is rather hard that the ratepayers should have to pay it.

The MAGISTRATE: The ratepayers? How so?

Mr. FRY: Yes; because the expense of carrying out the Act is payable by the ratepayers out of the general funds of the Board. I think to that extent it is only fair and reasonable, and I trust you will see it to be so, to make an order for the costs. It is no consideration to the Gas Company.

Mr. PHILLIPS: I beg your pardon.

The MAGISTRATE: I shall follow the example set by my colleague in the last case decided here, that of the Commercial Gas Company, and allow merely 2s. costs.

BRIGG PETTY SESSIONS.—TUESDAY, JAN. 1.

CONVICTION FOR NON-PAYMENT OF GAS-RATE.

Mr. *George Eyre*, of Caistor, was summoned for non-payment of a gas-rate amounting to 4s. 10½d. The case was originally before the Bench on the 18th ult., and was then adjourned for the production of proof of the appointment of the gas inspectors.

Formal evidence in support of the case having been now given,

Mr. PRIESTLY, who appeared for the defendant, contended, first, that the complainant, the Overseer, having failed to give seven days notice before demanding the rate, could not get it in the way sought; secondly, the Inspector had not complied with the requirements of the Act for lighting and watching a town, by placing lamps at all reasonable places, as there were several houses where Eyre lived and no lamp there; thirdly, the Overseers had levied a rate for more money than the Inspectors agreed upon; fourthly, that at the meeting convened for the adoption of the Act the Chairman refused to entertain a proposition by one of the ratepayers for an adjournment of the meeting for four months, thereby making all subsequent proceedings illegal.

The CHAIRMAN said they had given the case a fair consideration, and they regretted to say, on the first objection, they would have to dismiss the case. As to the second, the Inspectors had been chosen by the ratepayers, and it was in their power to erect lamps, and it was not likely that they were going to take gas half a mile out of the town for one house. As to the third, they knew the impossibility of getting a rate for the exact amount required. As to the fourth, it was absurd to propose such a thing as an adjournment for four months in the darkest part of the year, and the Chairman was quite right in refusing to put it to the meeting.

WEYMOUTH POLICE COURT.—FRIDAY, JAN. 4.

(*Before Dr.* DREW.)

CONVICTION FOR NEGLECTING WORK.

Charles Berry, late a stoker in the employ of the Weymouth Gas Company, was summoned for damage sustained by reason of defendant absenting himself from the employ of the Gas Company, whereby they had sustained damage to the amount of £55.

Mr. STONE, the Company's Manager, stated he gave orders, it being Christmas time, that the stokers should each have a day's holiday in turn. Defendant's holiday was given him on Wednesday, the 26th of December, and he should have been at work the following day. He did not return until Saturday, when he (Mr. Stone) refused to take him on to work again, as he had been compelled to engage another man in his place. Owing to the absence of defendant there was a shorter supply of gas than usual; in about 24 hours 20,000 cubic feet were really lost. The pressure had to be lowered considerably, and he had to light a new bench of retorts to keep up the supply. The loss to the Company was really about £20 on account of defendant absenting himself from work.

Defendant pleaded that he had had a glass too much during his holiday, and was in such a state as not to be able to go to work.

The MAGISTRATE said, if the other stokers had followed the example of the defendant, the town would have been left in darkness, and he was not surprised the manager pressed this case. Defendant would be fined £2 and costs, which he would be allowed a month to pay in.

Defendant said he had no means of paying, as he was now out of work. He was informed that, in default of his paying the money at the expiration of the time allowed, he would be sent to gaol for 28 days hard labour.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.

At the Meeting of the Board on Friday last—Sir J. HOGG in the chair,

A letter was read from The Gaslight and Coke Company, referring to the return of the Board's Gas Examiner, which reported that the gas tested at Graham Road testing station on the 11th of December was only 14·7 candles, stating their inability to account for the deficiency in the illuminating power, and requesting the Board, for the reason stated, not to proceed for the statutory fine. The deficiency was rather more than one candle, and it was pointed out that for seven years there was not one instance of a fine imposed, showing how uniformly and well the Company had performed their duties. The letter from the Gas Company arose out of a report presented at the last sitting of the Board by the Special Purposes and Sanitary Committee, stating that the gas supplied by the Company from their Shoreditch station on the 11th ult. was reported by the Board's Examiner to have been deficient in illuminating power to the extent of 1·3 candles, and recommending that, unless the Chief Gas Examiner certified that the defect was occasioned by unavoidable cause or accident, application be made to a magistrate for his warrant of distress on the Company to the amount of the forfeiture for which they were liable. It having been moved that a reply be sent to the Company intimating that the Board saw no reason for complying with their request, and that it was intended to proceed for the penalty,

An amendment was moved by Mr. JONES to the effect that the Board should not take any further steps in the prosecution. He said that, from practical experience, he knew, as a fact, that the Company supplied gas of an illuminating power equal to over 17 candles, which was more than one candle in excess of the parliamentary requirement. Looking, therefore, at the fact that, as a rule, the consumers got more than value for their money, and that this case of deficient illuminating power was so very exceptional an occurrence, he thought the Board might with a very good grace retire from the prosecution.

Mr. LEGG seconded the amendment.

Mr. ROGERS said the testing of gas in the Metropolis was a farce, and any fine inflicted upon the Company came out of the consumers pockets, so that he did not see the good of taking these proceedings. At the same time he should vote for the motion.

Mr. RUNTZ supported the amendment, remarking that, in consequence of recent amalgamations of smaller undertakings with the Chartered Company, intercommunications had been effected between many of the different mains, and he had no doubt that this deficiency of illuminating power, on the occasion complained of, had resulted from the atmospheric air getting into the pipes while junctions were being made. Under these circumstances, he thought the Board had done their duty, and that they might now very fairly let the matter drop.

After some further conversation the amendment was negatived and the motion adopted.

CHELSEA VESTRY.—At the meeting of the Vestry on the 1st inst., Dr. Barclay, the Gas Examiner, reported, "The illuminating power of the gas as supplied to this parish has been decidedly low during the past quarter. Taking, as I have continued to do, the burner which was in use for testing the gas when the Company were rendered liable to penalties for supplying gas of which the illuminating power did not reach the minimum of 12 candles, I find on several occasions it fell below this standard. The results altogether are very unsatisfactory, but they could only be remedied by fresh legislation." The report was referred to a Committee to consider, and it was resolved to send a remonstrance to the London Gas Company as to the quality of their gas.

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health, on the Composition and Quality of the Metropolitan Waters in December, 1877 :—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen. As Nitrates, &c.	Ammonia. Saline.	Ammonia. Organic.	Hardness (Clarke's Scale). Before Boiling.	Hardness (Clarke's Scale). After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	19·20	0·134	0·120	0·000	0·008	12·6	3·7
West Middlesex	19·80	0·003	0·135	0·001	0·008	13·2	4·2
Southwark and Vauxhall	18·70	0·127	0·135	0·001	0·009	12·1	4·2
Chelsea	18·90	0·068	0·135	0·001	0·010	12·6	3·3
Lambeth	20·30	0·083	0·120	0·001	0·009	13·7	3·7
Other Companies.							
Kent	27·90	0·003	0·310	0·000	0·003	18·6	6·0
New River	20·20	0·036	0·150	0·000	0·007	14·3	3·3
East London	14·90	0·036	0·096	0·001	0·007	9·0	3·7

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was slightly turbid—namely, Grand Junction.

C. MEYMOTT TIDY, M.B.

EXTENSIONS AT THE PAISLEY CORPORATION GAS-WORKS.

(FROM OUR OWN CORRESPONDENT.)

On Wednesday, the 12th ult., an important undertaking was inaugurated in connection with the Corporation Gas-Works, Paisley—namely, the completion of a new gasholder of very large size, together with the necessary governor, connections, &c. The ceremony of turning on the gas from the new holder into the town was made the occasion for bringing together a very large gathering of the leading citizens of Paisley, and for giving a most interesting historical sketch of the progress of the gas manufacture and supply in the town for fully half a century. As was fit and proper, the presiding genius on the occasion was Provost Murray. That venerable gas commissioner, who, though over 70 years of age, is still hale and hearty, and one of the most active men in the town over which he is the much-esteemed chief magistrate, occupied a similar position in reference to the gas undertaking of the town fully 32 years ago. He is a sort of perpetual Provost of Paisley, and none of his fellow-townsmen is more familiar with the subject in question, or takes a keener interest in it. Without entering at present into the details of a comparison of this new gasholder with the holders throughout Scotland, we may mention that only in Glasgow and Leith are there any of larger dimensions.

Provost MURRAY, addressing the large assemblage of gentlemen present, desired, before turning the valves so as to permit the gas to pass into the town, to congratulate his co-trustees, the gas consumers, and the public generally on the successful completion of the important undertaking—a work that had occupied their attention for the past twelve months. The large increase that had taken place in the consumption of gas within the last few years, and the steadily increasing requirements of the community, had forced on the consideration of the trustees the necessity of providing increased storeage. A very short statement would suffice to show that they could not have longer delayed the work which had just been accomplished without incurring serious responsibility; and he would simply premise by mentioning that the rule which had now obtained universal sanction, especially for manufacturing towns, was that the storeage should range from a day to a day and a half's sale or consumption. The last gasholder erected at the works was completed in 1862, prior to which the annual consumption was 67 million cubic feet, the greatest daily sale being 390,000 cubic feet, and the storeage 262,000 cubic feet, or 33 per cent. less than one day's sale. After the erection of that gasholder, the storeage was increased to 1½ day's sale, or 15 per cent. in excess of the highest daily consumption. The consumption last year was 125 million cubic feet, and for the present year it was estimated to reach 132,000,000 cubic feet, the daily sale having reached 800,000 cubic feet, or fully double since the erection of the last gasholder. The storeage before the new holder was completed was 475,000 cubic feet, or about 44½ per cent. less than one day's sale—in other words, there was little more storeage than for one-half day's sale, a state of matters anything but safe in a manufacturing town, owing to the possible momentary interruption of the process of gas manufacture. Now, however, by the completion of the new holder, the storeage was increased to fully 1 million cubic feet, more than doubled, or 17½ per cent. in excess of the highest daily sale. In the end of 1876 instructions were given for the preparation of the necessary plans and specifications for the increased storeage power resolved upon by the trustees. They were designed and prepared, and the superintendence of the undertaking was conducted, by their own engineer and manager, Mr. George R. Hislop, without any outside professional assistance, and the result was such as to reflect the highest credit on that gentleman's skill and ability. Tenders for the work were opened on Feb. 1, 1877, and ground was broken on the 14th of February, and the tank Messrs. William Brodie and Co., Paisley, for the holder, columns, girder, was completed in five months, or only two weeks beyond the stipulated period. The engineers began on the 13th of July, and were finished with the holder on the 22nd of November, since which date they had been engaged on the governor, connections, and other minor works. Considering the extraordinarily unfavourable weather of the past season, it was surprising that the whole work had been accomplished in so short a time. It was most satisfactory that it had been executed in a substantial and tradesmanlike manner, and to the entire satisfaction of the engineer. The trustees had received from the hands of the contractors a first-rate job, and he (the Provost) had heard that opinion confirmed by neutral tradesmen. He then gave a brief description of the works, saying the columns, 16 in number, which formed a prominent feature, were executed in the Tuscan order of architecture, and were bound together at the top with an ornamental lattice girder 30 inches deep. In order to prevent accidents to the workmen, when engaged in painting the crown of the holder, or removing snow from it, a protection rail had been placed round the outer edge of the holder of the same architectural order as the columns and girders—the first example of such an arrangement in Scotch gas-works. The same architectural design had been carried out in the governor in the adjoining building. It might be interesting to notice the quantity of iron used in the construction of the works under consideration:—Columns, &c., of cast iron, 300 tons; governor and minor works, 50 tons; plate and wrought iron in the holder, 176 tons—total, 526 tons. The following were given as the dimensions of the gasholder:—Outer lift, 130 feet in diameter; inner lift, 128 feet; depth of each lift, 25 feet; so that the cubic contents amounted to 675,000 cubic feet; the available storeage capacity being 640,000 cubic feet. After some further remarks, Provost Murray said it was a pleasing reflection that so extensive a work, extending over ten months, of a dangerous nature, and carried on under most unfavourable weather, had been completed without loss of life, only two accidents having occurred during the course of the work, neither of which had left any serious consequences.

The Provost then proceeded to turn on the gas, under the direction of Mr. Hislop, and, after three hearty cheers from the company, and a fervently expressed wish for the future success of the work, his worship invited the party to partake of luncheon in the retort-house, which had been specially fitted up for the occasion, and had undergone a transformation scene as magical as any pantomime can show during this festive season. Nearly 120 gentlemen sat down to the bountiful and handsome luncheon. Provost Murray occupied the chair, and was supported on the right by Colonel Holmes, M.P.; and the two croupiers were Bailies M'Gown and Eaglesim. At the one end of the retort-house there was a very conspicuous gas illumination, bearing the appropriate motto—"Ex Fumo Dare Lucem." After one or two toasts had been pledged,

Mr. HOLMS rose and said that although there was no formal list of toasts, yet there was one which he would venture to propose on the occasion, and which he was sure would be received with the greatest enthusiasm. It was that of "The Corporation Gas Trust." The provost, magistrates, and town council, under various names, performed varied and honourable duties. They were Burgh Governors and Dispensers of Justice, Water Commissioners, Gas Commissioners, and Police Commissioners; and he had never proposed their health on any former occasion with greater pleasure, because as Gas Commissioners they had given a fresh proof of their intelligent enterprise, and their appreciation of the wants of the community. Such an occasion naturally led them to think of the past, and to look back 30 years and note what a change had occurred. Thirty years ago the very name of Paisley was almost synonymous with distress. The amount of income with which the authorities had to intromit was something like £3000; now it was over £60,000. He thought there could scarcely be a better proof of the progress of the town than the demand for an increased supply of gas. It indicated either that the town was extending or that the existing houses were better lit. During the last 15 years the consumption had actually doubled. After noticing the work and progress of the Water Trust, and referring to the control of the turnpike roads within the burgh, he said it was extremely desirable that the local authority of every large community should have under its own control the three essentials for progress—water, light, and good roads; and he availed himself of the opportunity to show how fully he appreciated a good supply of gas, by saying that when Sir Windham Anstruther brought in his Bill giving power to acquire gas-works all over Scotland, he (Mr. Holms) put his name to the back of it; and the Bill had since been successfully carried through Parliament.

Provost MURRAY, after thanking Mr. Holms and the company on behalf of himself and his collegues, proceeded to remark that gas lighting, or rather its application to public use, was comparatively a modern invention. Many of those present would, he knew, recollect when their own old town, and all the towns of Scotland, were lighted with oil lamps. He was himself old enough to recollect with what curiosity, when a young man, he went to see a shop lighted with gas in Moss Street; and even yet he could go to the window at the head of Dyer's Wynd, where an enterprising merchant had lighted his shop with gas, made in a small gas-works which he had fitted up in his cellar behind. The first lighting of the town of Paisley was done by a joint-stock company, whose Act of Incorporation received the Royal Assent on May 30, 1823. It was interesting, he said, to recall the names of those persons who had the public spirit and enterprise to furnish the town with such a great boon. He then mentioned the names of the first directors of the company, the twelve original directors, only one of whom was now represented in the town by any family. It was rather curious to notice that in the first Act of Parliament the term "gas," or "coal gas," was not used, the description being that "the said company is established for the purpose of producing inflammable air for lighting the said town and Abbey Parish." The original capital of the company was £16,000, raised in £5 shares. In course of time it became necessary to extend the works, and in 1832 a new Act was obtained, authorizing the creation of a second and third stock, each of £16,000. Only one-half of the third stock had been called up when, in 1844, an occurrence took place which arrested the further creation of stock, and, in other respects, totally changed the management of the works. It was then that the interference of the corporation in gas matters commenced. A clever and energetic parliamentary solicitor, who had, in the previous session of Parliament, been successful in carrying the Act for establishing the City and Suburban Gas Company in Glasgow, contrived to start, in 1844, no fewer than four new gas companies in Scotland—in Aberdeen, Perth, Greenock, and Paisley. In the cases of Aberdeen and Perth new Acts were obtained, and new works were erected, but in the case of Greenock the Bill was withdrawn, because the works in that town were practically held for the corporation, while in the case of Paisley the new company were ultimately defeated in the House of Lords after a severe and expensive parliamentary contest, on the strength of an arrangement by which the old works were to be ceded to the public and managed on their behalf by a joint board of shareholders and trustees named by the town council. The interference of that body in gas matters originated in this way: The new company applied to the town council for leave to open streets and proceed with the proposed new works without an Act of Parliament, on the faith of a promise to supply cheaper and better gas, and on the alleged ground that the old company had threatened to give opposition in Parliament. The town council were of opinion that there was no room for a new company, the existing works being quite sufficient to meet all the wants of the community for a long time to come. While they felt that they could not well interfere between two companies competing for public favour, they saw that there was great danger that the public might ultimately be called upon to pay a return on a double capital, and they sought to impose the following conditions upon the new company in the event of granting permission to open streets—1. That the company should restrict their dividends to 5 per cent. interest, and 1 per cent. for a sinking-fund. 2. That the company should amalgamate with, or sell their works to the old company without first offering them to the town council at a price to be fixed by arbitration. To these terms the company would not agree. While this was the attitude of the town council to the new company, they represented to the old company that the only ground on which they could oppose the new company was that the old company should consent to accept of a

reduced dividend, and cede their works to a public trust for the behoof of the town's people. The controversy which ensued divided the community, and many of the audience would doubtless recollect the "gas question," as it was then called, and how it became really a "burning question," and led to a state of excitement which had never since been paralleled in bitterness by any controversy, political or otherwise. He (Provost Murray) had never seen any reason to question the soundness of the policy adopted by the town council at that time. The best proof of its soundness was to be found in the fact that the two rival companies in Aberdeen, after competing for a year or two, got tired, and agreed to amalgamate, when the consumers had to pay an enhanced price for their gas in order to provide interest on two capitals. It was also found in the fact that not only had all the large towns in Scotland followed the example of Paisley, and acquired the gas-works,* but that, two sessions ago, Parliament had even passed a general measure to enable corporations to become owners of gas-works, and to supply gas, without the necessity for private Bills. Returning, however, to the subject of the Paisley gas supply, he said that the new company, after having carried their Bill in the House of Commons, were defeated in the House of Lords; and the temporary joint trust which was created by the agreement of 1845 continued for 25 years, and wrought well for the public interest. In 1869 it was felt that so much of the original stock of the gas company had been redeemed, that such an extension of the works had been made by the public, and that the interest of the shareholders in the undertaking had become so small that it was felt to be wrong in principle that private shareholders should possess so much control over a public trust; and, accordingly, a new Act was obtained whereby the works were transferred entirely to the management of the town council. The Provost next gave a short *résumé* of the progress of the works, comparing the condition of things in 1845, when the company ceased, with that in 1870, when the exclusive management of the town council began, as also with the condition now attained:—

Year.	Coals Carbonized. Tons.	Gas Produced. Cubic Feet.	Storeage. Cubic Feet.
1845	4,411	40,411,700	190,000
1870	9,259	86,018,000	475,000
1877	13,700	127,000,000	1,000,000

Revenue.

Year.	Gas.	Residual Products.
1845	£8,606	£192
1870	13,902	1762
1877	22,600	2809

In 1845 the original capital had reached to £40,000, and the redemption price of £8 per £5 share was £64,000. Of that original capital there had been redeemed £15,943 at a cost of £24,056, and the amount in the sinking-fund for redemption was £2601. During the 32 years that had elapsed since the works passed from the hands of the gas company, not less than £37,723 had been expended on new works. Those large sums for redemption and extensions had been mainly paid out of surplus profits, while the gas had been sold as cheap as, and frequently cheaper than, in any of the other large towns in Scotland. In conclusion, Provost Murray said that the ground owned by the Gas Commissioners had now all been occupied by the extensions of the works, and that it had been the subject of considerable anxiety to the trustees for some time how they were to provide for future extensions; but he was happy to announce that within the last few days they had secured four acres of ground to the east of the works which would afford ample room to provide extensions for the next 50 or 100 years.

Bailie M'Gown, in proposing the toast of "The Contractors," said that the Provost spoke so well and so fully as to render speaking on the part of his Bailies almost unnecessary. In choosing contractors for the work, the trustees had to satisfy themselves of their business reputation. They found that Messrs. Adam Bros. and Messrs. Brodie and Co. were fitted to execute the work which they had undertaken, and the opinion of practical men was that the trustees had got a good job. He hoped that coming years would show that opinion to be well founded, and that the job would turn out satisfactorily.

Mr. Brodie replied in an excellent speech. He was greatly pleased at the cordial manner in which the toast had been received. He had been very anxious to secure the contract, especially as he was a native of the town. As to the holder, he did not require to say anything in its favour; it could speak for itself. The Provost, of course, had gone into such a complete history of gas lighting that nothing was left for him to say. There was one point, however, which was not taken up by him, and which he might refer to. He (the Provost) had said that gas lighting was a modern thing; but it had become a very important thing, and it was to the credit af Scotchmen that they were the first introducers of it on an extensive scale. He more especially referred to the labours of Mr. Murdoch, manager of the world-wide famed firm of Boulton and Watt. About half a century ago the people had very erroneous notions about gas. No doubt that was owing to the ignorance of the people; they did not know how to use it properly. But they were advancing. The Royal Society, with Sir Joseph Banks as president, sent a deputation to the House of Commons to petition the Government to restrict the capacity of gasholders, or restrict the contractors from building too large holders. The maximum size at that time was 6000 feet; now they had one in Paisley capable of holding easily 640,000 feet, and which was 107 times larger than the restricted size. With reference to the work, he said they would have been done with it a month or six weeks before their time, but for the unfavourable season, which had been the worst during the last 45 years for doing outdoor work. Without being egotistical at all, he must say that he was a sort of judge of such work. He had done work which had gone to Canada, Sweden, the East Indies, Austria, and Italy. He had been over England and Scotland (and Ireland, as far as Cork), and he could tell them that, in all his travels, he had never seen anything to equal the architectural beauty of the holder just inaugurated, which reflected the highest credit on their engineer, Mr. Hislop. That gentleman was well known, and occupied a high position in the gas world; but he had added a laurel to his name by that architecture. As regarded the proportions of the new holder, he must say they were not too heavy, while everything was able to do its work properly. There was a great difference in the new holder from those that were made fifty years ago. Then the builders made them like boilers; they were afraid of the explosive force, and of course made them four times stronger than they needed to be. There was not only material wasted, but the additional weight had to be counterbalanced. Mr. Hislop, however, had constructed his holder so that there was no superfluous weight in it. It managed to give the maximum pressure, but nothing more. It was self-acting, and required no compensation weights. But that result was not attained at the expense of the substantial article, for, with ordinary care, it would last half a century at least; nay, more, he believed it would last a century if well taken care of.

Mr. W. Adam also replied, and said that, though his brother and he hailed from Callander, they were both Paisley men. They always felt pride in claiming Paisley as their native place, the birthplace of many illustrious men.

Bailie Eaglesim proposed the toast of "The Manager of the Gas-Works." He spoke of that gentleman's qualifications as being so highly appreciated not only in Paisley, but throughout the whole country, that there was no need to say a single word. His appointment to Paisley by the late Provost Philips had been a matter of great consideration, but the high opinion then entertained of him had been more than realized; and it was known that he had stood at the very head of the Gas Managers Association.

Mr. Hislop replied in suitable terms.

Several other toasts followed, including that of "The Old Servants of the Gas Company," proposed by Mr. David Semple, F.S.A. (who recollected well the cutting, in 1824, of the first sod out of the field in which the works were situated), and replied to by Mr. Nairn, the manager of the original gas company.

* Provost Murray seems not to know that the gas supply of Edinburgh and Leith is still in the hands of private companies.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The past week has been, to a great extent, almost wholly of a holiday character, in part owing to the prolonged nature of the usual Christmas vacation, and partly by reason of the fact that at many of the large concerns the interval is now being made use of for the purpose of taking stock—a proceeding which is no light matter at the larger works. The inauguration of the new year appears to have been the signal for the springing up of a very general agitation on the wages question, and the course of things is now so much altered that the employers are completely masters of the situation, no matter how much the men may threaten all sorts of resistance. At the great Atlas and Cyclops establishments of John Brown and Co., and Charles Cannell and Co., for instance, the puddlers have agreed to accept a general reduction of 6d. per ton, and the shinglers a drop of 5 per cent. At the Milton and Elescar works of Messrs. G. and W. H. Dawes, the ironworkers have turned out on strike against a proposed reduction of 5 per cent., and at Rotherham the puddlers of the Northfield Iron Company (who are now likely to resume their operations) object to the acceptance of 7½ per cent. under former prices, by agreeing to which reduced rate they can alone obtain renewed employment. In both these cases, however, the masters are almost certain to triumph, as are the other employers who are about to adopt a similar course of action.

The business of the week in all kinds of iron has been meagre, and there appears to be every probability of a weak state of trade for some time henceforward, unless something definite should be almost immediately made known on the Eastern Question. There is abundance of pig iron to be had, and prices are purely nominal in all directions. The same observation applies to the finished and manufactured iron trades.

There is also a plentiful supply of all descriptions of coal and coke, and prices continue quiet.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

There has been but little doing in either the coal or iron trades of this district during the past week, in consequence of the holidays, many of the forges and collieries being closed up to yesterday (Monday), and at none of them was there much work doing during the whole of last week.

For coal, the demand has been chiefly for the better sorts suitable for house fire purposes, and orders, as a rule, have been supplied out of stock; but this branch of trade continues exceptionally quiet for the time of the year. The requirements for manufacturing classes of fuel have naturally been restricted by the general stoppage of work, and at present there seems to be no prospect of any active demand for either forge coal or engine classes of fuel, as very few of the iron manufacturers have forward orders on hand. The cotton trade of the district is very dull, and the chemical and salt trades, which are usually large consumers of slack, are extremely quiet. Nominally, there is no change in list prices, but there is a good deal of pushing for orders amongst the holders of inferior classes of fuel, and the average quotations at the pit mouth may be given about as under:—Best Wigan Arley (screened), 10s. to 11s. per ton; common ditto, 8s. to 9s.; Pemberton four-feet, 8s. to 8s. 6d.; common Wigan mines, for house fire purposes, 6s. 6d. to 7s.; forge coal, 5s. 6d. to 6s. 6d.; burgy, 4s. 6d. to 5s. 6d.; good ordinary slack, 3s. 6d. to 4s. 6d.; and common ditto, 2s. 6d. to 3s. per ton.

The shipping trade continues extremely dull, and good orders can be placed at very low prices, owing to the keen competition for any business coming into the market.

In the iron trade, buyers generally have been holding back until the close of the holidays, and the result of the quarterly meetings next week is known. Some very low quotations are reported in the market, but there is no business doing upon which to base any reliable quotation as to actual values, and nominally prices may be said to be without change, the principal makers, both in this and outside districts, showing no disposition to give way further, notwithstanding the underselling of speculative merchants and some of the smaller producers.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

Since the close of the holidays, as might have been expected from the state of affairs in the Northumberland Colliery districts, there has been more trade astir amongst the Durham Collieries. A good deal of what is termed second-class gas coals in ordinary times is passing into the market as steam coals, and the result is what was predicted in this column a fortnight ago. Second-class Durham gas coals are becoming stiffer in the market, and there has been a rise in prices of something like 6d. per ton in some cases, but it is not very general. The best qualities of gas coals have likewise come into better demand. Steamers were freighted to load gas coals for Italy last week. There have been inquiries also for steamers to load gas coals for the Irish ports, and it may be simply stated that the best collieries in the gas trade are able to work full time and sell the produce of the pits at the rate of 8s. per ton, less 2½. Under the circumstances of the trade, and with the stoppage of the Northumberland pits, tending to give the Durham coals a temporary advance, there seems little disposition on the part of the Gas Companies to enter upon lengthened contracts for the present. The dispute in the Northumberland steam coal trade was even more embroiled last week than the week before. It seems pretty clear, however, that at the late rates of wages the steam coal owners could only make a loss, and they are now bent upon enforcing the full reduction of 12½ per cent. without delay, or they will keep their pits closed. House coals are in average seasonable demand, but nothing beyond that. Prices range from 12s. to 13s. per ton for best. A fair quality of second-class house coal is sold at from 10s. 6d. to 11s. per ton.

The freight market is very much depressed. Last week business was about nominal. Many seeking steamers are lying in the coal ports unchartered. The quotations for steamers to load coals to London are

4s. 3d., and to Dublin 6s. 9d. per ton; Limerick, £10 10s. for sailing vessels. The condition of the manufacturing trade of the North is simply unchanged. In fact, there is no business worthy of a name. The fears that have prevailed lest England should be forced into the fighting in the East continue to stop all sorts of speculation. Merchants will do nothing but a hand-to-mouth business, and there has not been a more gloomy first week of a new year for a considerable time. Of course, if there were any prospect of peace the state of trade would be entirely changed, and 1878 might turn out as good a year as 1877 has been a bad one. The working classes of the North of England have been subjected to a good deal of destitution, mainly through the falling off of business at the collieries and the little trade that has been done at the iron-works. There is considerably less house-building in the towns upon Tyneside. The market for chemicals is very dull, and there is little inquiry for manufactured iron.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The Lanark Gas Company have just completed some extensions and improvements of their works, which would have been carried out much earlier had it not been for a want of decision on the part of the Directors as to which of their works should be reconstructed. It was only at the annual meeting held last August that the decision was arrived at to abandon the new works, and make the desired alterations on what were the Old Gas Company's works, and which it had become absolutely necessary to delay no longer, the consumption of gas having increased 35 per cent. from the time that the price was reduced from 8s. 4d. to 5s. per 1000 cubic feet. On the advice of their Manager, Mr. Monk, they resolved to effect a general reconstruction of the works, so as to make them more suitable for the requirements of the town, and render the establishment something like a gas-works. Only the first portion has been completed, consisting of a large new coal-store, doubling the purifying apparatus and condensers, and adding a washer and a new tar-tank, the latter being so arranged that no pumping is required, the tar and liquor gravitating from the hydraulic main to the casks in which they are removed.

At the last meeting of the Town Council of Aberdeen it was resolved, on the recommendation of the Lighting Committee, to supply 200 additional street-lamps with flat-flame burners, making in all 1630 lamps throughout the town thus supplied.

On the evening of Friday week the tenth annual festival of the workmen employed by the Dundee Gas Commissioners was held—Mr. M'Crae, Manager, in the chair. The company numbered upwards of 300, and included some of the Commissioners. Several suitable and very interesting addresses were delivered by the Chairman and other gentlemen. Mr. M'Crae said they had never made so much gas in any previous year; never had they been able to supply the town of Dundee so well, and it was a very pleasing thing to know that there had never been so few people complaining.

The Dundee Gas Commissioners held their usual monthly meeting last Wednesday, at which it was resolved to borrow an additional £10,000 under the powers contained in the Dundee Gas (Additional Powers) Act, 1877; and it was reported that the sum of £9735 had been received in loan from 86 depositors. Mr. M'Crae submitted a most interesting report upon the new system of lighting street gas-lamps by electricity, which he concluded by saying that, in the meantime, he could not recommend the adoption of the new mode of lighting; however, it would be further investigated into, and seen in operation where it had been introduced.

A considerable amount of excitement is still being manifested in the town of North Berwick, regarding the late proposal to adopt the Burghs (Scotland) Gas Supply Act and the withdrawal of the same. There is a discussion in progress on the question as to when the proposal can again be brought forward officially—at the end of the present year, or not till the lapse of three years.

The annual meeting of the Macduff Gas Company was held on the 26th ult.—Provost Martin in the chair. After the approval of the balance-sheet and the report for the year ending the 20th of December, and the election of the Committee of Management, a dividend of 5 per cent. was declared on the past year's profits.

Business was done on the 2nd inst. in Glasgow Corporation 6$\frac{1}{2}$ per cent. Gas Annuities, at the former quotation of 159$\frac{3}{8}$.

In no instance did the official returns on the quality of the Glasgow gas for the week ending the 29th ult. show a lower minimum than 25·80 candles, while the maximum illuminating power ranged from 26·77 candles to 28·57 candles, and yet the consumers will complain of the quality of the gas which they are getting, if we may judge by talk at the Town Council meeting held last Thursday.

Stimulated by the action of the Southborough Local Board, on the question of lighting the street-lamps with oil instead of gas, some of the Ardrossan and Saltcoats gas consumers are becoming loud in their complaints at the quality and cost of the gas supplied to them, and urging that oil should be tried, while sighing a little longer for the coming electric light.

During the last ten days or so there has been practically very little doing in pig iron and coal, in consequence of the Christmas and New Year holidays. Both commodities have remained almost stationary in price, and it would seem as if the price of pig iron were destined not to go below 51s. 6d. cash per ton.

FUEL AT ODESSA.—It is reported that fuel has become so dear at Odessa that the Water-Works Company have been obliged to stop their engines. This example has been followed by the Gas Company and several other factories.

WOKINGHAM WATER SUPPLY.—A new company, called the Wokingham District Water Company, was registered under the Joint-Stock Companies Act on the 20th ult., with a capital of £20,000, in £10 shares, for the purpose of supplying water to the town and parish of Wokingham, and the parishes of Binfield, Warfield, Easthampstead, Sandhurst, and Fitchhampstead, and other places in the county of Berks.

ILLUMINATION OF THE TAY BRIDGE.—On the evening of Saturday, the 22nd of December, a series of gas-lamps which have been erected upon the high girders of the Tay Bridge were lighted for the first time, and the effect was very fine. The bridge would certainly have a splendid appearance if illuminated across the whole way in the same manner. It is stated that the lighting is subject to the orders of the Board of Trade authorities, who have now to consider how the navigation of the river is affected.

PATELEY BRIDGE WATER SUPPLY.—At a recent meeting of the ratepayers of Pateley Bridge it was unanimously resolved that, in recognition of the action to be taken by the Rural Sanitary Authority for providing a pure and sufficient supply of water for domestic purposes for the town, such Sanitary Authority be requested to take the necessary steps for constituting the town and neighbourhood a separate contributory place, in which specified area there shall be a uniform rate in the pound paid for domestic consumption, and a fixed charge per 1000 gallons agreed upon for business premises and purposes.

WATER SERVICE OF ST. LOUIS.—The Mississippi water supplied to St. Louis is abundant in quantity and wholesome in quality, but in colour it is suggestive of weak coffee without milk. To the stranger it is a surprise, not altogether pleasant, and to wash or bathe in it or drink it requires some courage at first. It is, however, good water, and in many respects much better than that supplied to some other large Western American cities. In summer the daily consumption is about 27 million gallons. As the weather grows colder the average drops down to 20 million gallons per day. All this water comes from the Mississippi.—*Engineering.*

DARLINGTON CORPORATION GAS SUPPLY.—At the meeting of the Darlington Town Council, on the 3rd inst., a report was presented by the Gas Manager, which stated that the quantity of gas made in the half year ending the 31st ult., amounted to 55,698,100 cubic feet, as compared with 54,409,100 cubic feet in the corresponding period of the previous year, being an increase of 1,289,000 cubic feet. The coal used during the last half year was 5659 tons 18 cwt., as against 5305 tons 11 cwt. in the second half of 1876, being an increase of 354 tons 7 cwt. The average make of gas per ton of coal for the last half year was 9833 cubic feet, against 10,255 cubic feet in the six months ending Dec. 31, 1876, showing a decrease of 422 cubic feet.

SINGULAR ACCIDENT THROUGH AN ESCAPE OF GAS.—An accident of a rather alarming nature took place at Stonehaven some days ago. While Mr. Graham Ross, gas manager, and Mr. James Burness, plumber, were engaged in re-laying a connection of gas-pipes between the main in Allardice Street, and the premises of Messrs. Mowatt and Sons (Carron Tan-Works), the plug got out of the pipe, and a considerable quantity of gas escaped, which, making its way through an aperture in the wall of a leather store, was set on fire by a naked light burning there. The flame very quickly ran along to the pipe from which the gas was escaping, and suddenly burst out on Ross and Burness, scorching them very severely on all exposed places. Fortunately, owing to the prompt manner in which the mouth of the open pipe was plugged with a lump of clay, the fire was quickly extinguished, and serious damage was prevented.

QUALITY OF THE NEWCASTLE-ON-TYNE GAS.—Mr. John Pattinson reports the following as the results of his examinations for December of the quality of the gas supplied to the borough by the Newcastle-on-Tyne and Gateshead Gas Company:—

Date, 1877.	Illuminating Power in Sperm Candles.	Grains of Sulphur in 100 Cubic Feet of Gas.	Sulphuretted Hydrogen.
Dec. 4	14·4	7·11	None.
„ 7	14·6	6·17	„
„ 11	14·9	7·36	„
„ 14	15·1	6·58	„
„ 18	14·9	7·41	„
„ 21	15·3	8·08	„
„ 24	15·3	5·48	„
„ 28	15·3	7·27	„

A Sugg-Letheby standard Argand burner is used in testing. According to Act of Parliament, the gas should not be of less than 14 standard candles illuminating power, nor contain more than 17 grains of sulphur per 100 cubic feet of gas.

BURSTING OF A FILTER POND NEAR NEWCASTLE.—On Monday, the 31st ult., about a quarter past six o'clock in the morning, the wall supporting the south side of one of the Throckley filter-ponds, to the extent of 50 yards, fell in a solid mass. It was fortunate that at the time there was only about fifteen inches of water in the pond, which has an area of nearly 24,000 square feet, but this was sufficient to overflow the ordinary escape for the waste water and washed the main turnpike for a distance of nearly half a mile, to the depth of 2 feet. Happily, the means of escape to the Walbottle Dene and over the sloping banks to the River Tyne was good, and the only damage occurred to a house on the turnpike side, occupied by Mrs. Makepeace, it being flooded to the extent of 1 foot. The ponds have been in the course of erection for the last four years, and are constructed from the plans of the Water Company's Engineer, Mr. T. R. Foster. The foundation consists of rubble stone, about 16 feet in thickness at the bottom, and sloping gradually until at the height of 18 feet it measures 7 feet; this had to support a brick wall 5 feet wide at the bottom, 9 feet high, and 2 feet wide at the top. The foundation has given way; the weight of the upper portion of the wall and the water appears to have torn the rubble asunder, while the brick wall seems to have fallen in a solid mass. The damage will amount to some thousands of pounds.—*Northern Echo.*

COAL AND ITS COMPONENTS.—On Wednesday evening last Professor Barff, M.A., delivered the first of a series of "Juvenile Lectures," at the Society of Arts, Adelphi, taking as his subject "Coal, and its Formation." The lecturer described briefly the supposed formation of coal, and showed specimens which proved its vegetable origin; he then proceeded to notice the various kinds of coal, and explained how they differ from one another in composition. The next subject touched upon was the method by which chemists determine the composition of complex bodies. A brief description was given of what is called proximate analysis; and, in illustration of this, an experiment was performed, which consisted of heating some fragments of coal in a hard glass tube. The products of the decomposition being passed through various receivers, the results produced showed water and coal tar in the first receiver, and in the second the blackening of acetate of lead solution proved the formation of sulphuretted hydrogen by the destructive action to which the coal had been submitted, thereby showing the presence of sulphur in coal. The gases which issued from the delivery-tube were burnt. He next explained what was meant by ultimate analysis, and illustrated this experimentally by burning a piece of coal in a hard glass tube, and leading, by means of an aspirator, the products of combustion first through a condenser and then through a solution of lime in water; in the first vessel water was condensed, and in the second the lime water became turbid, showing the formation of carbonic acid gas. Towards the end of this experiment pure oxygen gas was passed through the tube containing the hot coal, and the action became much more vigorous; and this afforded a place for an explanation of the work which oxygen performs in nature. The general properties of carbon were next explained, and its occurrence in nature in different forms mentioned. The general tests for carbonic acid gas were shown; how it always extinguishes a light, and its action on lime water, rendering it milky by the formation of chalk, or carbonate of lime. The existence of carbon in organic matters was shown by acting on a strong solution of sugar by concentrated oil of vitriol, the sugar being decomposed and abundance of carbon being set free, which frothed up and filled the large glass vessel in which the experiment was performed. It was also shown that carbonic acid is breathed out by animals. After this portion of the lecture was concluded, a series of experiments were performed by Mr. Orchard, of High Street, Kensington. This gentleman is largely engaged in condensing gases, especially nitrous oxide, or laughing gas, which is used in "painless dentistry." Professor Barff explained how it is that gases can be brought into the liquid condition, and the experiments of Mr. Orchard illustrated this explanation. They consisted first in allowing the escape of liquid carbonic acid from a strong iron vessel, the escaping

gas being tested by lime water to prove that it was carbonic acid, it was then allowed to rush out in a long stream, which from its whiteness was clearly visible, next it was allowed to rush into a metal receiver, and when the receiver was opened a ball of solid carbonic acid was turned out, which looked exactly like a snowball. Some of this solid was put into a test-tube, and the gas, slowly escaping, extinguished a lighted taper. Mercury was also frozen by a mixture of solid carbonic acid and ether; and the lecture concluded with some experiments with liquid laughing gas, which was exhibited to show a gas in the liquid state, for it is difficult to show carbonic acid in this condition in the lecture-room. The second of this series of lectures will be delivered to-morrow evening, and will treat of hydrogen and some hydrogen compounds obtained from the destructive distillation of coal.

Register of New Patents.

2526.—Goedicke, F. W. E. R., Stratford, Essex, "*Improvements in the means and apparatus for the effectual and profitable disposal of sewage, without pollution of rivers and watercourses, and without any alteration of the usual water-closet and drainage system.*" Provisional protection only obtained. Dated June 19, 1876.

This invention has for its object the distribution of sewage, either for the fertilization and irrigation of land, or for the manufacture of manures and chemicals, and consists of improvements in conveyance of the by-water carriage-way collected sewage by the operation of its own water, without or after disinfection, from one or several outfalls, to localities for the use of farmers and others, by means of one or several pumps varying in construction according to circumstances, to force the sewage through pipes, covered channels, or sewers, into cisterns or tanks fixed in the different localities for final utilization. Each cistern is parted off in one or more compartments by perforated partitions, or two or more tanks are connected by strainers or sieves, thus separating the solids from the liquids. The solids are carted away, the liquids go directly on to the land by perforated pipes or otherwise, or are distributed by water-carts. On suitable outfalls or localities, the sewage is cleared at once, by a strainer or otherwise, from the solids to be carted away, and the liquids to be distributed by pipes to the land or chemical works; or, where required, the solids and liquids might conjointly, by the same operation, be at once distributed in an unseparated condition for the utilization of land.

2527.—Hazlehurst, G. S., Runcorn, "*Improvements in and apparatus for pumping liquids, and pumping and condensing gases, such apparatus being also applicable for use as a blowing or exhausting engine.*" Patent dated June 19, 1876.

The principle embodied in this invention consists in the gas or air being set in motion or pumped, by causing columns of liquid to intermittently change their level by the action of steam or air pressure supplied through a suitable slide or other valve. The apparatus consists of two suitably shaped tubes or vessels joined together at the bases, and partially filled with liquid; steam or other pressure is intermittently applied to the liquid in vessel No. 1, thus causing the liquid to change its level and rise and fall in vessel No. 2. The pressure may be applied intermittently to vessel No. 1 through a slide-valve, or by other suitable means. Vessel No. 2 is provided with suitable valves, so that as the liquid rises and falls fresh liquid, gas, or air is drawn in and then discharged in any required direction. At or near the bases of the vessels are seatings, on which the floats at the extremity of the stroke may rest, thus forming a joint, and preventing the liquor being forced too far.

2539.—Beck, W. H., Cannon Street, London, "*Improvements in furnaces for the manufacture of gas and for other purposes.*" Provisional protection only obtained. Dated June 19, 1876.

This invention relates especially to furnaces used in the manufacture of gas, but is also applicable to furnaces in general, especially those in which a high heat is required to be uniformly kept up, or which are required to be replenished at short intervals, or to be kept open a considerable length of time for cleaning out and clinkering.

Whenever, as is usually the case, a flue or chimney is used in connection with a furnace, the inrush of cold air which necessarily takes place as soon as the furnace door is opened produces a sudden lowering of the heat, with consequent waste of fuel and other disadvantages. The object of this invention is to avoid this difficulty, and to this end the furnace door is connected with the damper in the chimney or flue in such manner that the opening of the door closes automatically the damper, thus shutting off the draught, and effectually preventing any cold air from entering the furnace while the door remains open. On the other hand, the closing of the door re-opens automatically the damper, in which event the normal draught of the furnace is resumed.

It is in this automatic operation of the draught-regulating damper that this invention is comprised, and any suitable mechanical arrangements may be employed for connecting the door to the damper. One arrangement consists in fixing to the door the axis or rod which holds the eyes on the door to the stationary eyes on the door frame so as to turn with it. This axis or rod is prolonged so as to extend above the top of the furnace, and carries on its upper end a crank-arm provided with a wrist-pin, on which is hung one end of a connecting-rod, the other end of which is attached to the sliding damper. The crank is fixed on the axis or rod in such a position that when the door is closed the crank will be turned so as to retract or draw out the damper from the flue or chimney opening, while when the door is opened the crank will be turned so as to move the damper to the full extent in the direction requisite to close the flue or chimney.

2550.—Lake, W. R., Southampton Buildings, London, "*Improvements in adjusting wrenches or spanners.*" A communication. Provisional protection only obtained. Dated June 20, 1876.

This invention relates to a wrench in which the jaws are permitted to yield when the handle is returned to its first position, in order to slide over the corners or angles of the article to which it is applied preparatory to re-engagement with another side or face thereof. It also comprises an adjustable jaw in combination with a jaw fitted to a sliding bar, whereby the jaws may be adjusted relatively to the thickness of the nut or other article to be grasped, and the sliding bar will be engaged by a controlling lever always at the same shoulder or notch, regardless of the thickness of the article. It further comprises a manner of applying the head or journal of the adjusting screw to the supporting step; also the construction of the hollow handle of the wrench. The moveable jaw is adjustable relatively to the fixed jaw by means of a screw fitted to the shank of the moveable jaw, and swivelled to a step or stirrup which occupies a position at the upper end of the handle.

2583.—Wilson, R., and Leach, W., Accrington, "*Improvements in ejectors or apparatus for raising and forcing liquids.*" Provisional protection only obtained. Dated June 23, 1876.

The object of this invention is the construction of a simple form of ejector or apparatus for raising and forcing liquids, and consists in dispensing with the suction-pipe in such apparatus, and admitting the steam in a direct line with the discharge-pipe. This is accomplished by having the inlet for the liquid arranged in the form of holes surrounding the casing of the apparatus, which is immersed bodily in the liquid required to be raised; such holes thus not only form a strainer for the liquid being raised, but the working of the apparatus is less liable to be affected by the temperature of the liquid.

2591.—Redwood, T. B., North Finchley, London, "*Improvements in the manufacture of gas for burning.*" Patent dated June 23, 1876.

This invention relates to the following modifications in the method of applying a process for the manufacture of gas from coal, for which a patent was granted to the present inventor in 1875 (No. 2685).

Instead of conveying the gas immediately as it issues from the retort through the converting chamber or converter, it is made to pass through the hydraulic main before entering the converter, and in this way the gas produced in several retorts may be conveyed through one and the same converter. By this means also the gas before entering the converter will be deprived of much of the solid and liquid particles which it carries from the retort, and which are deposited in the hydraulic main in the form of tar. It is desirable to exclude as far as possible the less volatile part of the tar and all solid particles of carbon and dust from the converter, as these, if deposited on the surface of the copper in the converter will prevent it from exerting its peculiar and required action on the gas.

It is advantageous and, in working with large volumes of gas which pass quickly through the hydraulic main, it is important to adopt some method by which the solid and less volatile particles still retained in suspension may be removed by a sort of process of filtration or separation after the gas leaves the hydraulic main and before it enters the converter. This may be effected by the use of Pelouze and Audouin's mechanical condenser, or by causing the gas to pass through a cylinder with projecting longitudinal ribs on its inner surface, and a fan rotating with great velocity in the axis of the cylinder, so as to cause suspended liquid and solid particles to be aggregated by concussion.

This mechanical purification of the gas should be effected without cooling it, and while it is still at or near to the temperature at which it passes through the hydraulic main. It may even be sometimes advantageous to increase the temperature by means of a steam-pipe or otherwise, because, with a view to the production of some of the effects contemplated in the use of the converter, it is necessary to retain as much as possible of the more volatile hydrocarbons which are present in crude coal gas, and which, in contact with the red-hot copper in the converter, are transformed into permanent gases. To bring the gas into contact with the heated copper in the converter, it is filled, or partly filled, with copper tubes, each about 1 inch or 1½ inch in diameter, and from 18 inches to 3 feet in length. These are closely packed and arranged in such a way that there are two groups or bundles of them, each group filling the internal circumference of the converting chamber or cylinder, while there is a vacant space left between the groups, and the orifices of the separate tubes in the two groups are not exactly opposite each other. The current of gas is thus broken without its being too much obstructed.

The two ends of each converting chamber or cylinder should be closed with moveable lids or doors, which can be easily removed for the purpose of cleaning the copper tubes, so as to remove any solid particles that may accumulate there, and which may be caused by the previous imperfect cleansing of the gas.

It may sometimes be desired to produce and obtain the whole of the tar in the state in which it has hitherto been usually obtained in gas-making, while at the same time the quality of the gas may be improved by depriving it of sulphur in other form than that of sulphuretted hydrogen, and with this view the gas may be carried not only through the hydraulic main, but also through the condensers before it enters the converter. In this case, as the contemplated improvement in the gas will result from the decomposition of bisulphide of carbon, together with water and the production of sulphuretted hydrogen, and as most of the aqueous vapour which the gas carries from the hydraulic main will have been separated by condensation before it reaches the converter, it is desirable to introduce water or its vapour into the converter with the gas. This may be done in any suitable way to the extent of a pint or more of water, or an equivalent quantity of steam, for every 1000 cubic feet of gas. In operating in this way for the purpose of transforming bisulphide of carbon into sulphuretted hydrogen, the converter may be used at a lower temperature than is indicated in patent No. 2685.

It is preferred to operate as follows:—The gas as it comes from the hydraulic main is caused to pass through an apparatus, such as has been described for the removal of solid and previously condensed liquid particles, and then in its still heated state it is conveyed through a heated cylinder or retort lined with copper and packed with copper tubes, as described. By this means the volume of the gas, the inventor says, is increased, and its quality, both as regards illuminating power and freedom from sulphur in other form than that of sulphuretted hydrogen, is at the same time improved.

In cases where it is desired to obtain the whole of the tar in the state in which it has hitherto been usually obtained in gas-making, the gas, after passing in the usual way from the hydraulic main and through the condensers, may be conveyed through the converter, together with the vapour of water for the purpose of reducing the quantity of sulphur in other form than that of sulphuretted hydrogen, and in this case the converter may be kept at a temperature somewhat lower than that of a cherry-red heat. The converter should be heated externally by a fire, by which it can be kept at the required temperature, and the gas after passing through the converter is to be conveyed to the condensers and purifiers in the usual way.

2635.—Newton, A. V., Chancery Lane, London, "*Improvements in liquid-meters.*" A communication. Patent dated June 26, 1876.

This invention relates to that description of liquid-meters in which the flow of the liquid is measured by pistons working in cylinders, and operated by a head or pressure, which forces or causes the liquid to be delivered through pipes or otherwise, as required. It consists in a double-cylinder meter, in which each cylinder is furnished with a reciprocating and elongated or double-headed piston, and an intermediate cylindrical valve, operated by the piston, to control passages arranged for the purpose of effecting the reversal of the pistons, which latter and their valves move successively in like directions. The valves are what may be termed floating balanced ones, and the meter is constructed so that there is a free continuous outlet through the valves from the two cylinders, and a constant pressure of the liquid between the two heads of each piston. The liquid under pressure is admitted alternately to the four ends of the cylinders outside of the piston heads, by means of the intermediate valves which move back and forth with the pistons, causing the contained liquid to be forced out of the opposite ends of the cylinders.

The inlet-pipe is situated a little to one side of the longitudinal centre of the one cylinder, and the outlet-pipe to the opposite side of the longitudinal centre of the other cylinder; and in a line with each of these pipes is a passage connecting the two cylinders together. These passages are for admitting liquid from one cylinder to the other, and they are alternately covered by the cylindrical floating valves, which have a

broad annular recess in their outer peripheries forming passages for the flow of the liquid, and are driven alternately to the right and left, by the pressure of their respective piston heads against pins which project from their opposite edges.

On the top of the two cylinders are two cross watercourses or passages, which extend from the middle of one cylinder to the end of the other; and the like arrangement, but the inverse of this, is provided at the bottom of the cylinders. These cross watercourses or passages open at one end into their respective cylinders, at points within the control of the floating valves, and at their other end their parts are near the heads of the cylinders. By this arrangement the liquid supplied under pressure to the meter will fill the space between the cylinder heads, impart a to-and-fro motion to the pistons, and operate the valves so as to allow of a continuous discharge of the liquid.

By providing an indicator, which may be operated by the pressure of one of the piston heads against a lever, the amount of liquid passed through the meter will be ascertained.

2684.—Johnson, J. H., Lincoln's Inn Fields, London, "*Improvements in cocks.*" A communication. Provisional protection only obtained. Dated June 29, 1876.

This invention consists in constructing cocks with a stop arranged in such a manner that when the cock is shut the plug is secured and maintained in the position which closes the passage, so that it cannot become opened again accidentally or otherwise than at the will of the operator.

In order to obtain this result a bolt is provided, either on the side of the body or socket, or at the top or at the bottom of the cock, the extremity of which enters the plug automatically when the cock is shut, and prevents any accidental rotation of the plug.

According to one of several modifications, a cylindrical projection or bearing is cast or otherwise affixed to the side of the body of the cock, through which is passed a bolt terminating in a button, and acted on by a spiral spring. When the cock is closed and the hole in the plug is perpendicular to the axis of the cock, the bolt impelled by the spring enters the hole, and thus prevents any rotation of the plug. In order to move the latter it is necessary to liberate voluntarily the bolt with one hand, by pulling the button, and to cause the plug to make a quarter of a revolution with the other hand. The cock is then open, and the plug maintains the bolt drawn back until the moment when in closing the cock the bolt, under the action of the spring, agains enters the orifice in the plug.

2691.—Anderson, C., Leeds, "*An improved means or apparatus for connecting and disconnecting gas, water, or other pipes.* Patent dated June 30, 1876.

The object of this invention is to provide apparatus whereby gas, water, and other pipes may be brought together and held in position whilst joints are packed or run with metal; also to disconnect the joints after being made, and by it the breaking of pipes when of disconnecting them is avoided.

For the purpose of connecting two pipes, they are brought in a line with each other, and on each pipe is placed a clamp, as near as convenient to the part forming the joint. These clamps may be tightened on to the pipes by means of suitable wedges, screws, or their equivalents. Each clamp is provided with two screws of suitable pitch, which are placed directly opposite each other—that is to say, opposite each screw on one clamp is provided a screw on the other, and in order to form a connection between the two clamps, nuts are provided, into which the screws are fitted so as to work freely. By giving a rotary motion to the nuts, right or left, the screws are brought towards each other, or further separated, carrying with them the clamps. By this means the pipes are drawn together ready for packing, or drawn asunder and the joints separated. The nuts are caused to revolve by means of any ordinary ratchet arrangement actuated by a suitable lever or levers.

2712.—Henderson, A. G., Edinburgh "*Improvements in gas-meters.*" Patent dated July 1, 1876.

The object of this invention is to secure uniform registration independent of the liquid level, and without materially increasing the loss of pressure over that absorbed by the ordinary wheel.

This improved wheel is identical with the ordinary wheel, in so far that it revolves in a chamber, partly filled with water and gas, upon an axis; and in having four hollow chambers, which, fitted in their respective positions, completely surround the axis; and also in that gas and water alternately pass through these hollow chambers as the wheel revolves. Here, however, its identity with the ordinary drum ceases. It has no cover on the front end forming the fifth chamber of the ordinary drum. It has but one fixed central shield of large diameter supporting the four chambers, and which also serves to separate, from the main body of measured gas passing through each chamber, a small portion of gas which is expelled outside the wheel into unmeasured gas contained within the external case of the meter, and from whence it passes through the measuring chamber of the wheel a second time.

The inlets of the chambers as they successively rise out of the water are open to, and each chamber obtains its proper supply of gas (dependent upon the height of the water-line) from that contained within the external case of the meter, and which again is supplied from the mains. As the chamber fills with gas the wheel revolves, and not until the inlet is sealed in water do the outlets (for there are two) discharge the gas contained in the chamber. The gas inlet of each chamber may extend outside and over the wheel, and at the larger end of the chamber from the level of the water in front over the rim and to the level of the water at the back. The gas outlet of the main body of the gas is at the other and smaller end of the chamber, and extends inside from the height of the water level at front over part of the rim of the preceding chamber. The small portion of gas left behind in the chamber travels from the discharge port of the main body of gas a not less distance than an arc of a circle of 45°, or thereabouts, when it is discharged at the second discharge port, which extends over half the breadth of the rim, and over the back of the wheel to the height of the water.

The first discharge port is in communication with the spout, which leads the now measured gas on to the burners. The gas from the second port is discharged at the back of the wheel into unmeasured gas, from whence it passes a second time through the wheel. The water travels through the drum by the same ports as the gas.

Each chamber is made mainly of three pieces—namely, two hoods or sides, and a tapered band of the same metal, which answers to that portion of the rim or cylinder over one chamber of the ordinary drum and the quarter or partition, but differently extended. That portion of the band of metal answering to the rim or cylinder, and to the partition of the ordinary wheel, is extended about half its breadth or more to a suitable length, and their inner edges are soldered to the large central shield supporting the chambers. To a certain extent these chambers outwardly resemble the buckets of an elevator or dredger. The chambers when fitted together into their proper positions around the axis form their own inlets and outlets for the passage of both the water and gas, as well as being the measure.

The wheel has its inlets extended back and front from the surface of the water and across its outer diameter; the gas therefore exerts great power over the wheel, as it bears constantly on the greatest leverage of the wheel, the action of the wheel is consequently steady. The gas inlets may also be limited to the slits in the hoods, both in front and back, and the periphery of the wheel may then be a continuous band of metal. The outlets are placed within the wheel, and are situated at less than half the radii of the wheel. As the outlets rise out of the water, the measured gas is first discharged by the ports for its passage, which ports rise out of the water on the side where the bent pipe is situated earlier than the ports on the other side of the supporting shield. The bent pipe carries off the gas to the burners. The volume of gas detached from the main body by the shield is discharged into the unmeasured gas chamber.

It will be seen that the gas in passing through each chamber of the wheel divides itself into two portions in a direct and natural manner, the larger portion is discharged measured before reaching the extreme end of the chamber, and from thence it is conveyed through the bent tube (the spout) and on to the burners; the smaller portion travels the entire length of the chamber before it is discharged from the second outlet into the unmeasured gas contained within the external case of the meter. The outlets of each chamber are of equal area and, therefore, when the water-line lowers, an equally larger quantity of gas is discharged at both outlets. The converse holding good, that is to say, when the water-line is raised the quantity of gas discharged from the outlet of the chamber is lessened in equal proportion. There is, therefore, perfect reciprocity with the outlets, hence a fixedvolume of gas is discharged to the burners.

The four chambers around the axis of the wheel may be fitted in their positions in different ways. It may be done without bringing the chambers into direct contact one with the other, their relative positions each to each may be made with strips of metal and solder, so that a space from one to four-eighths of an inch, more or less, will intervene between each chamber; or the chambers may come into contact one with the other at different points, and soldered one to the other.

2814.—Davey, H., Leeds, "*Improvements in compound pumping-engines.*" Patent dated July 11, 1876.

This invention relates to the construction and arrangement of steam pumping-engines of the compound type—that is to say, having a high-pressure cylinder from which the steam, after performing work therein, passes to a low-pressure cylinder, and performs further work by expansion. The two cylinders are placed side by side, and the piston of each is connected to one arm of a bell-crank lever. The other arms of the two bell-crank levers are connected to one another by a rod, so that the two pistons always move in opposite directions. This enables the steam to pass directly from the one cylinder to the other at the same ends of the cylinders, whereby long passages for the steam are avoided, the valves simplified, and the strain on the foundations diminished. The ports of the cylinders may be governed either by slides or by double-beat or equilibrium valves. When the cylinders are double-acting two slides are employed, one at each end, or six valves, three at each end, governing respectively the supply to the high-pressure cylinder, the exhaust therefrom which supplies the low-pressure cylinder, and the discharge from the latter.

2824.—Linford, C., Leicester, "*Improvements in gas-engines, and in appliances connected therewith.*" Patent dated July 11, 1876.

The main feature and object of this invention is the construction of gas and air engines of large size and great power. This is accomplished by the combination of a piston fitted with a balance-weight, in such manner that the dead weight of the piston which has to be lifted by the explosion of gas and air, on the up or out stroke of the piston, in gas and air engines as hitherto constructed, may be reduced to a minimum, or only to so much as will overcome the friction of the piston packing on its descent, thereby reducing, a considerable amount, the charge of gas and air necessary for lifting the piston. In connection with and auxiliary to the piston a receiver and air-pumps are employed to empty the cylinder, or nearly so, of the exploded and residual gases during the descent of the piston, thus rendering unnecessary the continued descent of the piston to the bottom of the cylinder, as has been usual hitherto, to expel the exploded gases, at the same time obviating the necessity for raising the piston at the termination of its down stroke previous to the commencement of the up stroke.

2831.—Clark, A. M., Chancery Lane, London, "*Improvements in water-meters.*" A communication. Patent dated July 11, 1876.

This apparatus consists of a measuring cylinder of cast iron, lined with copper and closed at both ends, in which moves a piston formed of two cupped leathers clamped together by discs screwed on the piston-rod. A copper or other metal valve-casing is attached to one side of the cylinder by means of flanges. A valve-rod with valves for regulating the inflow and the outflow of the water extends from end to end of the casing, and passes up through a stuffing-box, where it is attached to a lever at the upper part of the apparatus. The piston-rod passes up through a stuffing-box, and its upper end, which is provided with friction rollers, is made to oscillate a weight, alternately in opposite directions, for raising or lowering the lever attached to the valve-rod, and thus to shift the position of the inlet and outlet valves. The valves during this movement are caused to press against annular seats, faced with india-rubber, screwed within the valve-casing, for shutting off the supply of water on the one side and opening it on the other, whereby the water is alternately admitted on each side of the piston. One of the friction rollers mounted on the piston-rod is made, on the completion of the downward as well as of the upward movement of the latter, to act upon mechanism for operating a counter to indicate the quantity of water passed through the meter at each stroke of the piston. This mechanism is enclosed in a casing which is provided with a glazed opening for inspecting the dials. A spiral spring arrangement may be employed in lieu of the weight for reversing the valves.

2870.—Preston, F. P., Prestige, J. T., and Preston, E. J., Deptford, "*Improvements in pumps and their fittings.*" Patent dated July 13, 1876.

The first part of this invention relates to various alterations in the construction of pumps of the description in which two or more pistons or buckets, actuated by a crank, work in one barrel or cylinder, and consists in introducing a friction ring or roller on each of the crank-pins. This ring or roller is cast direct on to the crank-pin after the crank has been properly turned, the friction ring or roller intervening between the crank-pin and the slotted cross head to which the crank gives motion. Sometimes instead of casting a friction ring or roller on to each pump crank-pin, it is preferred to cast an ordinary slide block direct on to it, and, in this latter case, the slide block is sometimes fitted with friction rollers.

The second part of the invention relates to the deck or suction-plate ordinarily used with a Downton's three-throw pump, and consists in substituting a modified bayonet joint instead of the ordinary male and female V-threads, thus considerably shortening the time occupied in connecting and disconnecting.

The third part of the invention relates to a sea-cock for inlet at ship's side to pumps and like apparatus, so that a clear straight passage right through is obtained, and without any sunken recess at the bottom of the valve, as is the case in ordinary clear-way valves, which are soon choked

up by seaweed and other like substances filling up the recess. This is accomplished by making one facing of the valve at the side in the ordinary manner, and the other facing on the bottom of the valve-box, which latter facing it is preferred to make of white metal poured into a recess at the bottom of the valve-box for its reception.

2898.—Preston, F. P., Prestige, J. T., and Preston, E. J., Deptford, "*Improvements in apparatus for regulating and controlling the flow of water for water-closets and fire hydrants.*" Provisional protection only obtained. Dated July 14, 1876.

In these improvements to an ordinary water-closet, a regulator with supply valve box and valve is fitted, which allows a certain regulated quantity of water to flow into the closet while the supply-valve is falling on its seating.

2933.—Steel, J., Glasgow, "*New or improved apparatus for purifying gas.*" Provisional protection only obtained. Dated July 18, 1876.

Purifiers constructed according to this invention consist of long cylindrical vessels, of boiler or other plates rivetted or bolted together, and having closed ends. These vessels are carried on two, three, or more sets of rollers, so that as power is applied to drive the rollers the cylindrical vessels are slowly rotated. The vessels are divided internally all round by means of longitudinal and transverse partitions into a continuous series of receptacles, which have the effect, whilst the vessels rotate, of partly lifting up the lime water or other purifying liquid and discharging it again after it has been carried some distance upwards, as well as of preventing the lime water or other purifying liquid from passing, except at a very slow rate, from the admission towards the discharge end of the cylindrical vessels.

A series of long narrow troughs or dippers also extend from end to end of the cylindrical vessels, and these also carry brushwood or wire projecting towards the centre of the apparatus, so that when the lime water or other purifying liquid, lifted by the successive troughs or dippers as the vessels rotate, has been carried to the desired height it is upset over the brushwood or wires, or allowed to fall in a shower, and thereby exposes a very extended surface to act upon the gas passing through the purifier.

The extent of surface kept in a wet state by the lime water may also be further increased by placing at intervals transverse divisions, alternately having a passage for the gas at the centre and the circumference. These divisions, dipping partly into the lime water or other purifying liquid in the lower part of the rotating purifier, as well as by the continuous trickle of the liquid from the brushwood or wires, are kept constantly moist, and by virtue of the openings for the passage of the gas being alternately at the centre and circumference, the rate of flow of the gas being thereby retarded, keep it a longer time in contact with, and therefore under the influence of the lime water or other purifying liquid. Gland joints are provided at the axis of the cylindrical vessels, both at the ingress and egress ends, for the inflow and outflow of the gas; and this not having to pass through a column of water, as in other wet purifiers, may be sent through it at a lower pressure.

The second part of this invention relates to the extracting and collecting of the ammonia from gas. It consists in passing the gas through apparatus like that before described, but which is charged with water or other ammonia-absorbing liquid in place of lime water.

2983.—M'Lennan, W., Liverpool, "*Improvements in lifting and force pumps.*" Provisional protection only obtained. Dated July 24, 1876.

The nature and novelty of this invention consist in making the working barrel in the form of a hollow cylinder, with the lower part semi-spherical where the piston reciprocates over the inlet branch, which projects down therefrom as a pedestal or stem with a strong flange cast on it for securing it to the deck or other suitable foundation as a basement plate, and to which, or a continuation of it, the lifting main or pipes are attached, preferably by flange joints.

2994.—Messenger, T. G., Loughborough, "*Improvements in valves for the circulation of hot water, which improvements are also applicable to the circulation of cold water, gas, or other fluids.*" Patent dated July 25, 1876.

The improvements consist in forming a chamber with two or more valve seats, and valves constructed of brass, iron, india-rubber, or other suitable material, opening and shutting upon the seatings as desired. Two or more valves are secured to a spindle passing through a gland into the chamber containing the seatings, which spindle forms the hinge of the valves, and it is actuated by a handle, toothed quadrant, worm and wheel, or their equivalents.

3010.—Smith, W., San Francisco, U. S. A., "*Improvements in fluid meters or engines for measuring or obtaining power from water, air, or gas.*" Patent dated July 26, 1876.

This invention relates to improvements in fluid meters, or mechanism applicable to measuring water, gas, or air, or obtaining power from the fluid passing through, the construction of which enables them to be used either as meters, pumps, or engines. It consists of a continuous series of collapsing pistons arranged in a circle within a partitioned enclosing case that has segmental or other suitably arranged cylinders within it, and an inlet and exhaust passage for the fluid passing through the case from one side to the other, so that the fluid in its passage will force the pistons through the cylinders, and thus give motion to the wheel that meshes or engages with the ring or segments which unite the pistons together.

3014.—Parsons, H., Birmingham, "*Improvements in joining or connecting pipes.*" Provisional protection only obtained. Dated July 26, 1876.

In joining or connecting pipes according to this invention, flanges are made on the ends of the pipes, the flange on one end of each pipe being hollow, and the flange on the other end being solid, and of a size and shape proper to engage in the hollow flange of another pipe, the solid flange of one pipe entering the hollow flange of the other pipe by a sliding motion in a direction at right angles to the axis of the pipe.

3073.—Magniat, H. L., Paris, "*A new or improved steam, gas, and water-tight metallic joint.*" Patent dated Aug. 1, 1876.

This new or improved universal metallic joint is made of a tube of metal (no matter what metal, whether simple or composite), the said tube being filled interiorly with any kind of textile material. The diameter of a joint being taken between the interior of the bolts and the exterior of the orifice, the piece of tube is cut but with an additional two centimètres for the crossing of a small or an average joint, and 3 centimètres for a large one. The two ends are then flattened out by hammer to the form of wedges with very thin extremities, and the form of the flanges of the joint is given to it. The two flattened ends are then closed, and it is placed between the flanges, care being taken to place the junction facing a bolt; it is then tightened up until the key meets with moderate resistance, and if the joint does not then close sufficiently, it is further tightened until a close joint is made. Under this pressure the tube spreads very uniformly—that is to say, as much to the inside as to the outside, this effect being produced by the core of textile material of any kind which is incompressible and without adhesion, thus giving elasticity for the filling up of the surfaces of roughened flanges, and the turning of one flange upon the other without effort, if they are not well placed, and that without tearing out the material, which would affect the lasting of the joint, and consequently its being used again if taken to pieces before it is worn out.

3092.—Macartney, G., Greenock, "*Improvements in couplings for fire-hose, or other pipes or tubes.*" Provisional protection only obtained. Dated Aug. 2, 1876.

This invention has for its object the improving and rendering more efficient in their action certain kinds of couplings for fire-hose or other pipes or tubes, in which the parts of the coupling are held or locked together by pins, which are screwed through one part catching on a shoulder formed on the other part, and between which a cupped washer or flexible ring is introduced to act as a packing.

3095.—Slater, J. W., Tamworth Terrace, London, "*Improvements in deodorizing and purifying sewage.*" Patent dated Aug. 2, 1876.

This invention consists, firstly in the use of mixture of hyposulphite and sulphite of lime in the treatment of sewage; and, secondly, in the treatment of sewage with infusorial earth—that is to say, either mixing the earth with the sewage, or filtering the sewage through the earth, or both.

3124.—Robertson, G., Fenchurch Street, London, "*Improvements in apparatus for exhausting gas, and applicable for inducing currents of various fluid or pulverized or granular matters.*" Provisional protection only obtained. Dated Aug. 5, 1876.

One object of this invention is to obtain a simple and simultaneous adjustment where the steam or other motive fluid combines with the gas or other matter to be exhausted or moved in a gradual manner, or at two or more successive stages.

In the apparatus employed, the orifices for the steam-jets are in an annular form, encircling the pipe or passage through which the gas has to be exhausted, and the adjustment of these orifices is effected by means of a single intermediate piece forming a short length of pipe between them. One end of the intermediate piece is screwed into a box fixed on the end of the pipe by which the gas enters the apparatus, and this box has a steam-pipe connected to it, and is formed with an annular channel by which the steam has access to the annular orifice. This orifice is between a nozzle formed in the box and entering into the end of the intermediate piece, which is formed with a conical or funnel throat, so that the orifice is enlarged or diminished accordingly as the piece is screwed out of or into the box. The other end of the intermediate piece is screwed into a second box fixed on the continuation pipe, and having a second steam-pipe connected to it; and in this case the nozzle is formed on the end of the intermediate piece and the conical throat in the box. The intermediate piece has right-hand and left-hand screw-threads at its opposite ends, and is adjusted by turning it by means of a hand wheel fixed on it, the one movement opening or closing both orifices equally and simultaneously.

3138.—Fox, St. G. L., Sussex Place, London, "*Improvements in the means or apparatus for lighting and extinguishing gas-lamps by electricity.*" Patent dated Aug. 8, 1876.

This invention was described and illustrated in the Journal of Jan. 1, page 18.

3145.—Cathels, E. S., Montreal, Canada, "*Improvements in apparatus used in the purification of gas.*" Patent dated Aug. 9, 1876.

In the arrangement of washers generally the length of the vessel is considerably greater than its breadth, and the gas is caused to flow through it lengthwise, the longest contact of the gas with the vessel's liquid contents, and, therefore, the maximum amount of "wash," being thus presumably secured. But the effect produced—in spite of various contrivances to prevent it—is that the contents are driven by the pressure of the gas into a heap at the outlet end. This seriously impairs the vessel's efficiency, and also increases the back pressure of the gas. To obviate these defects is the object of this invention, and the first distinctive principle of these improvements is to divide the oblong washer, as ordinarily used, by cross partitions, into compartments or sections, each being a complete washer of itself, and together forming one combined washer, the increased power or efficiency of which is as the number of such compartments.

A second important characteristic of the improved arrangement is that instead of these several compartments being on the same level, they are elevated the one above the other in succession, so that when the charge in the lowest or first one is sufficiently strengthened or saturated to be drawn off, that of the second one can be emptied therein, the third one into the second (should there be three), and similarly with the others. In the event of there being more than three such compartments, the uppermost or last one only requires a fresh charge.

A third main feature of the present invention consists of certain arrangements for effectually dividing or breaking up the gas, in order to secure its being brought into more intimate contact with the wash liquid or liquids. Inside of each compartment, and within a few inches of its front plate, there is a plate or curtain (having its lower edge serrated about 4 inches deep), which extends the full length of the compartment, and is bolted to the cover and both ends of the same, but which only reaches say three-fourths of its depth. Coinciding with each of these notches or serrations, there is an inverted V-shaped trough with a flange at each end, fixed at right angles with the curtain, one end being bolted to the curtain, and the other end to the back plate of the compartment, both sides of each trough having serrations, about 2 inches deep, extending its full length.

The liquid charge in each compartment is to be of such a height as to at least cover the curtain serrations, and, consequently, the troughs also, or to any additional height desired. This is effected by increasing the height of the outside self-acting overflow-pipe, attached to each compartment at one end of the washer, by means of a long screw with which it is provided.

The gas way between the compartments consists of a slot or opening in the top of each division plate, extending the whole length of such division plate, but of such a depth only that, multiplied into its length, the area shall equal that of the vessel's gas connecting-pipes. The charges in the respective compartments are emptied into each other by means of outside pipes (having each a stopcock) at one end of the washer connecting the compartments.

The gas, on entering the first compartment, impinges against the curtain, and spreads to both ends, blowing the contents of the narrow chamber or space between the front plate and the curtain into the body of the compartment behind the latter (but the depth of which is not thereby materially increased owing to the great difference of their areas), and, in virtue of the series of unequal dips or seals of the curtain serrations, passes through the same in equally-divided streams, in which state of separation it flows into and along the inverted troughs, and then escapes through the serrations therein in minute streams or threads, in which attenuated condition it bubbles up through the wash liquid. In the subsequent compartments, by reason of the form of their inlet openings or ports, the gas enters each in a thin sheet extending from end to end of the compartment, slides down the face of the curtain, and the washing in a finely-divided form is repeated, the gas finally leaving the washer by the outlet-pipe from the last or uppermost compartment.

The washer may be constructed of cast-iron plates properly jointed and bolted together, wrought-iron plates bolted or riveted together, or of timber

strongly framed, and is to be provided with a filling-pipe (an inverted syphon forming part of it, to prevent the escape of gas when filling), connected to a pump, or supplied from an overhead cistern, and having a stop-cock, the connecting and overflow pipes referred to, together with a pipe leading from the latter to an underground tank, and an emptying-pipe connected to the bottom of the lowest compartment (furnished with a stopcock or valve), the end of it being immersed a sufficient depth in a seal cup to prevent escape of gas, and a pipe leading from the seal cup to the underground tanks.

3161.—THOMAS, J. T., Philadelphia, U.S.A., "*Improvements in apparatus for separating liquids.*" Provisional protection only obtained. Dated Aug. 9, 1876.

The object of this invention is to provide means for effecting the rapid separation of mixed liquids of different specific gravities, specially the ammoniacal liquor and tar which are discharged in a commingled state from the hydraulic mains, condensers, and washers employed in the manufacture of illuminating gas, in order to facilitate the collection of the products for utilization. To this end the improvements consist in the combination of an inlet and an outlet pipe, a tank or chest, a series of moveable dividing plates, and a bridge plate and tar dam.

To carry out the invention an oblong tank or chest is provided, having an inlet pipe or spout connected to one of its ends near its top, through which pipe the liquor is supplied, a tar delivery-pipe being connected to the opposite end near the bottom. A series of vertically-moving dividing plates, varying in number according to the dimensions of the apparatus, are arranged transversely to the tank, and can be adjusted at any desired height therein upon guides or grooves in the sides. Between the tar delivery pipe and the dividing plate nearest thereto, a bridge plate is placed transversely to the tank, extending across the same from the top or thereabouts for the major portion of its depth, and a tar dam extends across the tank between the bridge plate and delivery pipe from the bottom of the tank to a point about the same distance above the lower side of the bridge plate as the distance from the latter to the bottom of the tank. The bridge plate can be adjusted vertically, so as to leave a greater or less space below it, according to the relative densities of the liquors which may be from time to time operated upon; and the height of the tar dam may also be varied as required, by placing an additional strip or strips upon its top. One or more longitudinal openings in the upper portion of the sides of the tank, between the bridge plate and the dividing plate nearest thereto, communicate with a delivery box or boxes, to which are connected the ammoniacal liquor delivery-pipes.

In the operation of the apparatus the dividing plates are adjusted at different heights in the tank respectively, increasing towards the delivery end thereof, by means of wedges, pins, or other suitable appliances. The liquor supplied through the inlet-pipe is compelled, in its traverse of the tank, to pass beneath the dividing plates, which break its current, and cause the subsidence of the heavier particles of tar, the lighter ammoniacal liquor being arrested by the bridge plate and led off through the upper openings to the delivery-pipes. Moreover, the spaces between the several dividing plates constitute chambers, in which the upper strata of liquid, being comparatively quiescent, will be separated, in virtue of the different specific gravities of their components.

It is obvious that a greater or less number of dividing plates may be employed, and, further, that the tank may be so constructed that the current of inflowing liquor will be caused to traverse its length and return in a reverse direction, by means of a longitudinal partition and a connection at the end opposite the inlet-pipe, so as to be delivered adjacent to the latter.

3164.—BROTHERHOOD, P., Notting Hill, "*Improvements in apparatus for compressing air or other elastic fluid.*" Patent dated Aug. 10, 1876.

In carrying out this invention the patentee claims, first, the use of two or other number of pump cylinders fitted with trunk or differential pistons, so that each cylinder is rendered equivalent to a pair of single-acting pumps, of which the one has less capacity than the other; secondly, a method of cooling the trunk pistons of compressing pumps, by causing them to work over stationary tubular plungers communicating with a supply of water.

3173.—YOUNG, W., Clippens, N.B., "*Improvements in carburetting air and gases, and in the mechanism or apparatus employed therefor.*" Patent dated Aug. 11, 1876.

This invention has for its object the regulating the quality or illuminating power of gases made by diffusing the vapours of hydrocarbon fluids through permanent gases, such as are known as hydrocarbon water gas, pneumatic or air gas, and other similar gases.

The hydrocarbon fluids generally employed for this purpose constitute the most volatile portions of the hydrocarbons produced when coal or shale is subjected to destructive distillation, or the most volatile of the petroleums. These fluids consist of a series of hydrocarbons having very different boiling points, and, consequently, diffusible through any permanent gas in very variable proportions. Change of temperature also very much affects the amount of those fluids which may be diffused in them in the form of vapour; the lower the temperature the smaller the volume of vapour diffusible through a given gas. This variableness in the diffusibility of those hydrocarbon vapours through air or gases has, to a large extent, interfered with their practical application for illuminating purposes, for on first bringing the air or gas and carburetting fluid into contact, the volume of vapour taken up by the air or gas is more than sufficient to give the necessary quantity of light; and, on the other hand, when the more volatile portions have been removed by the air or gas, the remaining fluid becomes so heavy that it no longer yields the necessary amount of vapours to the air or gas to afford the desired amount of light; and again, in consequence of changes of temperature affecting the amount of vapours diffusible through the air or gas during cold weather, the light is very deficient; and, *vice versâ*, during warm weather the air or gas is over-rich from the excessive quantity of vapours of the hydrocarbon fluid diffused through it at high temperature.

This invention has more particularly for its object to regulate the amount of vapours taken up from a hydrocarbon fluid to the extent which is desired, or which is sufficient to give the desired amount of light. To accomplish that object, advantage is taken of three conditions relative to the diffusion of vapours through gases. These conditions are—

1. The change or increase of volume resulting from the diffusion of vapours through a gas.

2. The change of specific gravity resulting from the diffusion of hydrocarbon vapours through a permanent gas.

3. The change or relative rate of effusion of gases which takes place when a greater or less volume of vapours is diffused through them.

To apply the first condition, two measuring vessels are employed, which are connected together in such a manner that the one shall deliver a measured quantity of the air or gas to be carburetted into the vessel containing the fluid hydrocarbon, or carburetter; the other measuring vessel takes delivery of the carburetted air, and measures it out. The carburetter consists of two or more compartments, so connected with a valve or valves that the air or gases may be made to pass through one or more compartments of the carburetter, as may be desired.

In applying the increased specific gravity from the diffusion of hydrocarbons through a gas or air, to regulate the quantity of vapour to that desired, a carburetter is employed, similar in construction to that already referred to. The carburetter is also provided with a small regulating gasholder controlling the valve arrangement. The mode of causing the increase of density in the carburetted gas to actuate this gasholder, is to take advantage of the increased weight of a column of carburetted air or gas of considerable height to act upon a supplementary governing gasholder provided with a valve, which is more or less opened as the column of carburetted air or gas is heavier or lighter; that is to say, should the air or gas be carburetted to a greater extent than is desired, then the extra weight resulting from this over-carburation will relieve the supplementary governing gasholder. This will cause an increased pressure of air to be admitted to the carburetter, which in turn, actuating the regulating gasholder which is balanced to support a column of carburetted air or gas of the desired specific gravity, closes successively the chambers of the carburetter till the proper specific gravity is obtained, and, consequently, the proper amount of vapour diffused through the gas. Or instead of the arrangement just described, a balloon or large chamber may be delicately balanced, and on the carburetter attached to this balance is the valve or valves for regulating the current of gases through the carburetter.

3209.—PEYROUSE, L. A. L. E. P. de la, Finsbury Circus, London, "*Improvements in the manufacture of gas.*" Patent dated Aug. 15, 1876.

According to this invention a method of producing gas is employed which prevents to the fullest extent the condensation of watery and hydrocarburetted vapours generated in the distillation of coal, and consequently the formation of bye-products, by causing these vapours, so soon as they are generated, and by the immediate influence of a higher temperature, to pass into a gaseous state. Such gases are richer, purer than the ordinary lighting gases, and do not require the ordinary washing process.

In carrying out the invention either a single through retort may be used, or two retorts placed side by side, and communicating with one another, so called twin retorts. If a single through retort be used, a charge is at starting introduced into one half only of the retort, the gas produced being led off from the opposite end of the retort. When the greater part of the volatile products contained in the coal have been driven off, the passage of gas from this end of the retort is cut off, and a passage opened for it from the opposite end. A charge of coal is then introduced into the empty end of the retort. The vapours produced from this last charge have consequently to pass through the incandescent and partially exhausted coal before they leave the retort. When the greater part of the volatile products have been driven off from the second charge, the first charge is withdrawn and a new charge introduced in place of it, and the vapours produced from it are caused to pass through the nearly exhausted second charge, and thus the process is carried on continuously. The two ends of the retort are heated by separate furnaces, so that either end of the retort may be retained at the heat required independently of the other end.

When the operation is to be conducted in two retorts coupled together, one retort is first charged, and when the greater part of the volatile products have been driven off from this charge, a charge is introduced into the second retort, and the vapours produced from it are led off through the partially exhausted charge in the first retort. When the second charge has had the greater portion of the volatile products driven off from it, the charge is withdrawn from the first retort, and a fresh charge introduced in place of it, the vapours driven off from this last charge being then conducted away through the second retort, and so on continuously. The two retorts are heated by separate furnaces, so that either of them can be maintained at the desired heat independently of the other.

By the means described the bye-products are reduced to a minimum, and the hydrogen which would have gone to compose them is used in the production of lighting gas. The gas produced will contain little or no ammonia, and the nitrogen contained in the coal will enter into combination with carbon in lieu of forming ammonia. The gas produced may be purified by being passed through the ordinary dry purifiers, first through a purifier charged with lime sprinkled with oxygenated water, or with a solution of some salt containing a large quantity of oxygen, which it can give up without difficulty. The other trays may, as usual, be charged with oxide of iron.

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4865.—SILBERMANN, A., Berlin, Germany, "Improvements in gas blow-pipe machines." Dec. 21, 1877.

4875.—THOMSON, W. R. M., Glasgow, "Improvements in direct-acting vacuum chamber steam lift and force pumps." A communication. Dec. 22, 1877.

4894.—CLARK, A. M., Chancery Lane, London, "An improved rotary pump applicable also as a blower and motor." A communication. Dec. 24, 1877.

4919.—WILSON, J. G., Manchester, "Improvements in and apparatus for carburetting gas to increase its illuminating properties." A communication. Dec. 28, 1877.

4928.—KIRKHAM, T. N., Westminster, HULETT, D., High Holborn, CHANDLER, S., sen., and CHANDLER, S., jun., Newington Causeway, London, "Improvements in apparatus for condensing, washing, and purifying gas and other vapours." Dec. 29, 1877.

4930.—LEGENDRE, L., Kennington, London, "Improvements in pumps or apparatus for raising water and other liquids to any height by suction or by suction and compressed air, and without the liquids passing through the pumps." Dec. 29, 1877.

4936.—BOURNE, E., Shifnal, Salop, "Improvements in balance-pumps for raising or drawing water from deep mines and other purposes." Dec. 31, 1877.

4937.—SIMON, H., Manchester, "Improvements in gas motor-engines." A communication. Dec. 31, 1877.

10.—HILTON, M., Prestwich, and JOHNSON, J. and S., Pendleton, Lancs, "Improvements in the application of gas motors to tram-cars and other self-propelling vehicles." Jan. 1, 1878.

12.—ROBINSON, H., and MELLISS, J. C., Victoria Street, London, "Improvements in the treatment of sewage and impure waters." Jan. 1, 1878.

35.—BEAN, E. C., Southsea, and HARRIES, B., Southampton, "Improvements in the means of and in apparatus for flushing and after-flushing water-closets, and to prevent waste of water." Jan. 2, 1878.

39.—BENSON, M., Southampton Buildings, London, "Improvements in pipe-joints for containing liquids, gases, and air, but more especially applicable to gas and water mains." A communication. Jan. 3, 1878.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

2644.—HADDAN, F. W., Westminster, "An improved liquid or water-meter or water-power engine." A communication. July 10, 1877.

2647.—MELLING, T., Aigburth, Lancs, "Improvements in water meters or apparatus for measuring and registering the quantity of water or other fluid flowing through pipes or other conduits." July 10, 1877.

2659.—RENNICK, C., Queen Victoria Street, London, "Improved apparatus for lighting and extinguishing gas." A communication. July 10, 1877.

2664.—Paine, W., Anerley, Surrey, "Improvements in liquid-meters." A communication. July 10, 1877.
2667.—Avery, C., Islington, London, "Improvements in rotary engines and pumps." July 11, 1877.
2710.—Morgan-Brown, W., Southampton Buildings, London, "A new and improved automatic gas-lighter." A communication. July 14, 1877.
2725.—Hanson, J., Savile Town, Yorks, "Improvements in treating sewage and other foul water by the use of liquids only, also an improved method of treating sewage and foul water by the use of solid ingredients combined with liquids, and improvements in softening clarified and hard water." July 16, 1877.
2766.—Canham, W., Liverpool, "Improvements in pumps." July 20, 1877.
3019.—Bonnefin, F. A., King's Cross, London, "Improvements in apparatus for filtering liquids, and separating solid matters therefrom." Aug. 8, 1877.
3330.—Foulis, W., Glasgow, "New or improved apparatus for lighting and extinguishing gas-lamps, part or parts thereof acting as governors for lamps or for analogous purposes." Sept. 1, 1877.
3368.—Jagger, W., Horsforth, Yorks, "A new or improved self-acting metallic packing for parts of steam, air, gas, or other fluid-pressure engines, or for pumps, or other machinery or apparatus in which packing is required." Sept. 5, 1877.
3922.—Dewrance, J., Borough, London, "Improvements in cocks." Oct. 23, 1877.
4071.—Kirkham, T. N., Westminster, Hulett, D., High Holborn, and Chandler, S., Newington Causeway, London, "Improvements in apparatus for condensing, washing, and purifying gas and other vapours." Nov. 2, 1877.
4141.—Needham, W., Kite, J. and J., jun., Vauxhall, London, "Improvements in machinery or apparatus for filtering or pressing semi-fluids and other matter." Nov. 7, 1877.

PATENTS WHICH HAVE BECOME VOID.

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

4326.—Allaire, P. L., "An improved manufacturing lighting gas by employing petroleum, schist, or other mineral or volatile oils." Dec. 16, 1874.
4357.—Greey, E. J., "Improvements in mechanism applicable to the construction of gas, steam, or water engines and pumps." Dec. 17, 1874.
4365.—Spice, R. P., "Improvements in the manufacture of gas." Dec. 18, 1874.
4404.—Munford, A., "Improvements in apparatus for lighting and extinguishing street and other lamps." Dec. 22, 1874.

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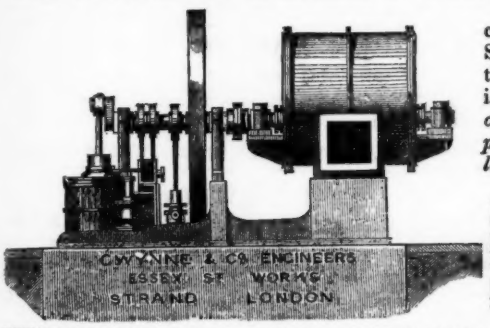

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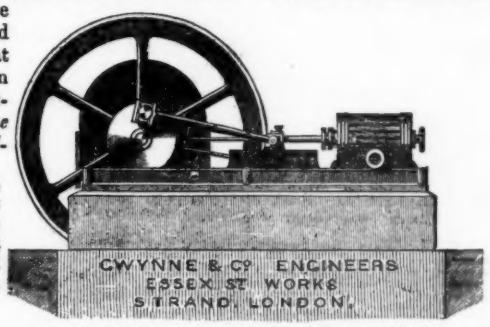

52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure.
Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers,
ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

☞ *G. & Co. are now making* 6 *Sets Exhausters and Engines for* 105,000 *cubic feet per hour,* 3 *Sets* 180,000 *Exhausters and Engines, with many others of all Sizes.*

NOTICE OF REMOVAL.

D. BRUCE PEEBLES & CO.

Beg to announce that they have REMOVED to their New Premises,

TAY WORKS, BONNINGTON, EDINBURGH,

To which all communications should now be addressed.
May 30. 1877.

THE FARNLEY IRON COMPANY, LIMITED,

FARNLEY, near LEEDS,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS & FIRE-BRICKS,

Of every size and shape, and of the best quality; also of White and Coloured GLAZED BRICKS, SANITARY PIPES, &c., &c.

In order to meet the constantly increasing demand for their Gas-Retorts, the F. I. Co. have recently made such an addition to their premises as will enable them to execute expeditiously the largest home or foreign orders.

London Agent for Gas-Retorts: D. W. OGG, 3, Jeffrey's Square, St. Mary's Axe, E.C.
" " Glazed Bricks: A. BARFIELD, 22, Great George Street, Westminster.

Now ready, price One Shilling, No. 14 *(to be continued Monthly) of*

A TREATISE ON THE SCIENCE & PRACTICE

OF THE

Manufacture and Distribution

OF

COAL GAS.

LONDON: WILLIAM B. KING, 11, BOLT COURT, FLEET STREET,
OR OF ANY BOOKSELLER IN TOWN OR COUNTRY.

For the convenience of persons resident in remote districts, arrangements have been made by the Publisher to forward the "Treatise" by Post, securely packed, at the cost of 1s. 2d. Monthly, or 7s. for the Half Year.

WANTED, Orders for Samples to test the superior Silkstone, Wigan, and other Gas Coals and Cannel on Sale by G. J. Everson, Gas Coal and Cannel Contractor, Birmingham.
N.B.—Prices on personal application, or by post or telegram, on shortest notice, and prompt delivery.

WANTED, a respectable, sober Man as GAS-FITTER, capable of working iron or compo tubes, repair meters, and take indices of meters quarterly. 28s. per week will be paid as wages. Certificate of good character indispensable.
Address No. 428, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

TO GAS-WORKS MANAGERS.

WANTED, a Working Foreman to take charge of a small Gas-Works in a town in the West Indies. Must be a thoroughly practical Man, and able to speak the Spanish language. Salary £15 per month.
Copies only of testimonials, and references, to be forwarded to No. 430, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, for the Seaham Harbour Gas-Works, a practical Man for Gas-Fitting, Pipe-Laying, &c. Wages 27s. per week, with a free house. None but steady men need apply, with references, to J. WHITE, on or before Thursday, the 17th inst.

WANTED, by a Continental Gas Company, a respectable, energetic young Man as METER INSPECTOR and practical GAS-FITTER. Wages £12 per month.

Applications, in own handwriting, with copies of testimonials, addressed No. 429, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, the Address of Gas Companies who have not received a Copy of the New Edition of PAMPHLET for GAS COMPANIES to distribute to their Gas Consumers—"Cooking and Heating by Gas."

Price £1 per 100, £6 per 1000. Copies by post Threepence—direct from the Author, MAGNUS OHREN, Gas-Works, SYDENHAM, S.E.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.

John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

WIGAN BOROUGH GAS-WORKS.

WANTED, a thoroughly practical FOREMAN Main and Service Layer. Preference will be given to one who has already held a similar position in a large Works. None need apply whose character and ability will not bear the strictest inquiry.

Apply, in own handwriting, to the Manager of the Gas-Works,

J. G. HAWKINS.

Dated Dec. 27, 1877.

ON SALE—One Station-Meter, to pass 1000 cubic feet per hour. Almost new. Will be sold cheap.

Apply to J. HALL, Gas-Works, St. Helen's, LANCS.

FOR SALE, One Gasholder, 33 ft. by 14 ft., with cast-iron tank, columns, girders, inlet and outlet pipes, and valves.

Apply to Mr. JOHN BUDDEN, Gas-Works, Poole, DORSET.

GAS-WORKS FOR SALE.

THE Proprietors are prepared to receive OFFERS for the Wymeswold (Leicestershire) Gas-Works. The Works consist of Retort-House, with a bench of two and a setting of one retort, Coal-Store, a comfortable Foreman's House, Meter-House, and Store-Shed, together with Retort-Fittings, Condenser, Scrubber, Two Purifiers, Meter, Governor, and Gasholder to contain about 5000 cubic feet, as well as the whole of the Mains throughout the village.

The streets are lighted up by 26 public lamps. The Works are of recent date, in very good condition, and are well situated.

The gas and meter rental amounts to over £200 per annum, and the consumers are steadily on the increase.

Further particulars to be obtained of Mr. J. B. BALL, Gas Engineer, LOUGHBOROUGH.

GAS PLANT FOR SALE.

THE Directors of the Newcastle and Gateshead Gas Company have FOR SALE the following ARTICLES lately used at the Gas-Works, Blaydon—viz.:

One Scrubber, 18 ft. high and 8 ft. diameter.
Set of Condensers, consisting of six 14-in. pipes, with bridge-pipes.
Three Purifiers, 7 ft. 6 in. square, and lifting apparatus.
21 5-in. Ascension-Pipes.
54 ft. Hydraulic Main, D-shaped, 18 in. by 18 in.
One Gasholder, 35 ft. diameter.
Four Columns for do.
One Station-Meter, 5-in. inlet.
One Governor.

With other necessary connexions, all of which may be seen at the Gas-Works, Blaydon.

Further particulars may be obtained from the undersigned, to whom written offers, either for the whole or part, should be sent on or before the 29th inst.

WM. HARDIE, Secretary.

Neville Street, Newcastle-on-Tyne, Jan. 2, 1878.

TENDERS FOR SULPHATE OF AMMONIA.

THE Directors of the Cork Gas Consumers Company are prepared to receive TENDERS for all the SULPHATE of AMMONIA to be manufactured at their works during the year 1878. Delivery f.o.b. Cork. Probable quantity 100 tons. Payment net cash on delivery.

Prices to be fixed on basis of 24 per cent. Ammonia, and tenders to state whether packages are to be supplied free by sellers.

Tenders will be received up to Friday, Jan. 11, 1878.

By order,
DENNY LANE, Secretary.

Company's Offices, 72, South Mall,
Cork, Dec. 13, 1877.

TO GASHOLDER MAKERS, &c.

THE Directors of the Northampton Gas Company are prepared to receive TENDERS for a Telescopic GASHOLDER, 100 feet diameter by 30 feet deep.

Plans and specifications may be seen at the Offices of the Company on and after Monday, Dec. 31, and copies of the specification and particulars may be obtained on payment of One guinea.

Tenders, addressed to the Chairman, endorsed "Tender for Gasholder," to be delivered at the Office of the Company on or before Wednesday, Jan. 24.

The Directors do not bind themselves to accept the lowest or any tender.

JOHN EUNSON, jun., Engineer.

Northampton, Dec. 21, 1877.

TENDERS FOR SULPHATE OF AMMONIA AND TAR.

THE Directors of the Devonport Gas and Coke Company are prepared to receive TENDERS for their make of SULPHATE of AMMONIA and their surplus TAR for a period of Six or Twelve months, from the 1st of February, 1878.

Estimated make of Sulphate about 90 tons per annum. Tar about 50,000 gallons.

Specifications may be had on application to the Secretary.

Tenders to be delivered on or before Monday, the 14th day of January, 1878, addressed to the Chairman, Devonport Gas and Coke Company.

By order,
JOHN WILLING, Secretary.

TO IRONFOUNDERS & GASHOLDER BUILDERS.

THE Directors of the Devonport Gas and Coke Company are prepared to receive TENDERS for the erection at their Works of a TELESCOPIC GASHOLDER and Iron TANK, about 80 ft. diameter and 24 ft. in depth.

Plans and specifications may be seen at the Offices of the Company, where copies of the latter may be had on application. Tracings of the set of drawings will be forwarded on receipt of P. O. order for One Guinea.

Tenders are to be sent in on or before Monday, the 28th inst., endorsed "Tender for Gasholder and Tank," and addressed "To the Chairman, Devonport Gas and Coke Company, Devonport."

The Directors do not bind themselves to accept the lowest or any tender.

JOHN WILLING, Secretary.

Devonport, Jan. 1, 1878.

STAINES AND EGHAM DISTRICT GAS AND COKE COMPANY, LIMITED.

TO GASHOLDER MAKERS.

THE Directors of this Company invite TENDERS for the supply and erection of a TELESCOPIC GASHOLDER, with two lifts of 18 ft. each; the outer lift to be 50 ft. 6 in. in diameter.

Tenders, marked "Tender for Gasholder," to be sent to the Secretary on or before Saturday, the 26th of January inst.

The lowest or any tender will not necessarily be accepted.

The plans and specification may be seen at the Secretary's Office, at Staines, and further information obtained of him, or of the Manager, at the Gas-Works at Egham.

JOHN ANTHONY ENGALL, Secretary.

Staines, Jan. 4, 1878.

DEVIZES CORPORATION WATER-WORKS.

CONTRACT No. 5.
RESERVOIR, ENGINE-HOUSE, ETC.

THE Town Council of the Borough of Devizes (acting as the Urban Sanitary Authority) are prepared to receive TENDERS for the construction of a Covered RESERVOIR, ENGINE and BOILER HOUSES, and other Works connected with the above Contract.

Plans and specifications may be seen at my Office in Devizes, or at the Office of the Engineer, Mr. Henry Tomlison, 4, Bene't Street, Cambridge, and bills of quantities can be obtained on payment of One Guinea each.

Tenders (endorsed "Water-Works, Contract No. 5") must be sent to me on or before Monday, the 21st inst.

The Corporation do not bind themselves to accept the lowest or any tender.

A. GRANT MEEK, Town Clerk.

Devizes, Jan. 2, 1878.

CAMBRIDGE GAS-WORKS.

TO BUILDERS AND CONTRACTORS.

THE Directors of the Cambridge University and Town Gaslight Company are prepared to receive TENDERS for the construction of a Retort-House, Coal-Sheds, Purifying-House, Meter-House, Residence, Office, and other works.

Drawings and specifications may be inspected, and forms of tender and schedules of quantities may be obtained (on payment of the sum of Three Guineas, to be returned on receipt of a *bona fide* tender) at the Office of the Company, in Sidney Street, Cambridge, and at the Office of Messrs. Thomas and Charles Hawksley, Civil Engineers, 30, Great George Street, Westminster, S.W., on and after Thursday, the 3rd day of January next, and tenders must be delivered at the Office of the Company on or before Wednesday, the 16th day of January next.

The Company do not pledge themselves to accept the lowest or other tender.

By order,
WILLIAM PEED, Secretary.

Cambridge, Dec. 20, 1877.

REMOVAL.

CHARLES HEISCH, F.C.S., Analytical and Consultimg Chemist, Superintending Gas Examiner to the Corporation of London, &c., &c., has REMOVED from 8, Savage Gardens, to 79, MARK LANE, where he may be consulted as usual.

TO HYDRAULIC, GAS, & HOT-WATER ENGINEERS, FIRE-ENGINE MANUFACTURERS, LOCAL BOARDS, CONTRACTORS, PLUMBERS, AND OTHERS.

The Valuable STOCK of the late Firm of Beck and Company, Limited, comprising about 20 Tons of Gun Metal, Brass and Iron Fittings, removed from No. 130, Great Suffo'k Street, Borough, S.E., by order of the Liquidators.

MR. BILLINGAY will Sell by Auction, at Taylor's Depository, near the Elephant and Castle, S.E., on Thursday, Jan. 17th, and following Day, at one o'clock prompt, the above, including Steam and other Cocks, High-pressure Valves, Gauges, Grease Cups, Syphons, Fire and Sluice Cocks, Hose Fittings, Stand Posts, Street Boxes, Hydrants, Road Watering-Posts, Deep Well, Force, and other Pumps, Iron, Gas, and Water Piping, Lavatory, Bath, and Closet Fittings, and a variety of other Goods of a like character.

May be viewed two days prior and on mornings of Sale. Catalogues at place of Sale; of Mr. E. GREATHEAD, Accountant, Moorgate Street Chambers, MOORGATE ST., E.C.; and of Mr. BILLINGAY, Metal Trades Valuer and Auctioneer, 64, King William Street, LONDON BRIDGE, E.C.

Now ready, price 7s., by Post 7s. 3d.,
A SECOND EDITION (fcap. 8vo., morocco gilt)
OF
THE GAS MANAGER'S HANDBOOK.
BY THOMAS NEWBIGGING, A.I.C.E.
CONSISTING OF
Tables, Rules, and Useful Information for Gas Engineers, Managers,
And others engaged in the Manufacture and Distribution of
COAL GAS.

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Prices, half bound, cloth sides, 2 quires, 30s.; 3 quires, 36s.; other sizes and bindings to order.

THE
GAS COMPANIES EXPENDITURE JOURNAL,
Being a Ruled Account-Book with Printed Headings, and Analyzing Guide for Keeping, upon the easiest and most correct method, the Expenditure of a Gas Company, in accordance with the provisions of the Gas-Works Clauses Act of 1871, and suitable for all Companies.

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Associate of the Society of Accountants in England,
Publisher of the
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Begs to announce his REMOVAL from Skinner's Place, Size Lane, to
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CONSULTING GAS ENGINEER,
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ENGINEER,
AND
CONSULTING GAS ENGINEER,
BARTON HOUSE, opposite BARTON ARCADE,
DEANSGATE, MANCHESTER.

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SPECIAL ACCOUNTANT FOR GAS COMPANIES,
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Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by A. L. to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.

The above forms are registered.

Water Companies Accounts also prepared and adjusted.

CONSULTATIONS.

Mr. ROBERT DEMPSTER, Sen.,
CONSULTING GAS ENGINEER,
Of Messrs. Robert Dempster and Sons, Rose Mount Gas Engineering Works,
ELLAND, near HALIFAX,
May be consulted on all matters connected with Valuations, Arbitrations, and Parliamentary Applications connected with Gas-Works. Our R. D., Sen., having been engaged on extensive Arbitration Cases, which, combined with his experience in Construction and Contracting, his knowledge of Engineering and Valuations, is both extensive and reliable.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

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Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

WILSON'S
SAFETY
AUTOMATIC PRESSURELESS DIP-PIPE,
SELF-CLEANING HYDRAULIC MAIN.
See Illustration and Description in JOURNAL OF GAS LIGHTING, *Dec. 4.*

Improved SCRUBBER, with Self-Acting Water Distributor.

Improved HYDRAULIC CENTRE-VALVE to work three or four purifiers.

Improved HYDRAULIC LIFT, by which one man can raise and remove purifier-covers of any size.

Plans and specifications prepared for New or for the Remodelling of existing Gas-Works.

Special Designs for Gas-Works for Tropical Climates.

Particulars, &c., to be had of the Patentee, Inventor, and Manufacturer, W. P. WILSON, Consulting Engineer, 80, Cannon Street, LONDON, E.C.

NOTICE.

THE GAS & WATER COMPANIES DIRECTORY, 1878.

(WATER SECTION.)

The Editor will feel greatly obliged if Secretaries and Engineers would fill up, and return to him at once, the forms sent them, as the work is now going to press. If any have not received Forms, they will be forwarded immediately, on application to the Editor,

CHARLES W. HASTINGS,

8, BUCKINGHAM STREET, ADELPHI, LONDON, W.C.

ECONOMY IN THE PRODUCTION OF GAS.

PLUTONIC CEMENT,

For Jointing and Repairing Retorts and Ovens *in* action and *out* of action.

A Pamphlet on the advantages of the above, with modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

WILLIAM RICHARDSON, Gas and Hydraulic Engineer,

CHARLES HENRY STREET AND BISSELL STREET, BIRMINGHAM.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET,

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PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

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GAS ENGINEERS & MANUFACTURERS,

IRONFOUNDERS AND CONTRACTORS,

GOWTS BRIDGE WORKS,

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ESTIMATES FOR GAS-WORKS OF ANY SIZE.

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N.B.—All Communications to be addressed to the FIRM ONLY.

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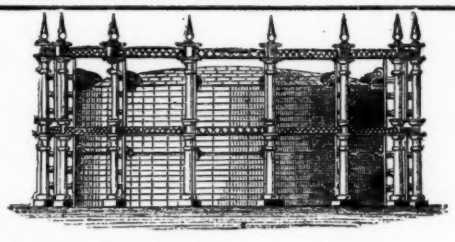

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ASHMORE & WHILE,

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GAS APPARATUS OF EVERY DESCRIPTION,

Including Improved

Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,

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N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

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MM. SERVIER, MONNIER, ROUGET, Engineers, specially in connection with the industry of Gas Lighting, will undertake to represent any Manufacturers who may be Exhibiting Goods in Classes 27 and 53. References in France and England.

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TO GAS ENGINEERS, MANAGERS, &c.

HILL and CO., Gas Engineers and Architects, 11, Appach Road, Brixton Rise, S.W., prepare Designs for the construction of New Gas-Works, Bridges, and Roofs, or for the remodelling and extension of existing Works. Also provide Drawings of all kinds of Gas Apparatus and Plant. Drawings, Tracings, and Specifications copied for Engineers and Contractors.

CATHELS'S Patent Gas-Washer is an excellent cleanser of gas from tar, ammonia, sulphur, and carbonic acid, reducing the cost of subsequent purification 30 to 50 per cent. Needs no motive power or attention beyond drawing off and recharging as required. Has no moving parts or complications to get out of order. Is of moderate cost, and is practically indestructible.

Application to be made to the Manufacturers, the Horseley Company, Tipton, Staffordshire.

PRICE'S PATENT COKE & COAL BARROW

effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. Price, Inventor and Patentee, Gas-Works, Hampton Wick, Middlesex.

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MANUFACTURERS OF

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SCOTSWOOD FIRE-BRICK WORKS, SCOTSWOOD-ON-TYNE,

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Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

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Mr. Romans has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

Analysis and Prices forwarded on Application.

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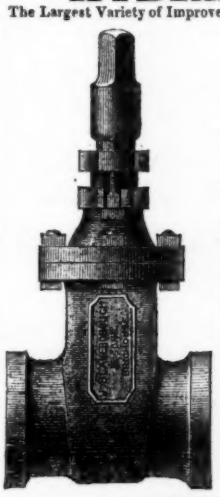

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Tested with 600 to 1000 feet head of pressure.

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MANUFACTURE EVERY DESCRIPTION OF
GAS AND WATER FITTINGS;
ALSO,
WROUGHT-IRON TUBES & FITTINGS.
SHORT STREET, LAMBETH, LONDON.

BELGIAN CLAY RETORTS.
J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.
Communications addressed to J. SUGG & Co., GHENT, will receive immediate attention.

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FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
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FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY,
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GAS AND WATER WORKS.

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And Every Description of Best Fire-Bricks.

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These Paints have been for many years extensively used in Her Majesty's Royal Dockyards, Woolwich Arsenal, the Shorncliffe and Curragh Camps, War Departments, and Colonies, and are largely supplied to Railway, Harbour, and GAS COMPANIES, Shipowners, Engineering Establishments, Railway Carriage and Wagon Works, and the Paint Trade generally. They are the BEST PROTECTORS of WOOD, CEMENT, and IRONWORK, even arresting corrosion after it has set in; and their base being oxide of iron, they are free from those properties which make lead paints so destructive to iron. They do not scale or blister, are not affected by great heat, and are the only Paints which will resist the effects of sulphuretted hydrogen. Their DURABILITY and covering properties have borne the test of A QUARTER OF A CENTURY'S PRACTICAL TRIAL.
The undermentioned colours—ground in best linseed oil, and requiring only to be thinned down for use in the ordinary way—are kept in stock:—

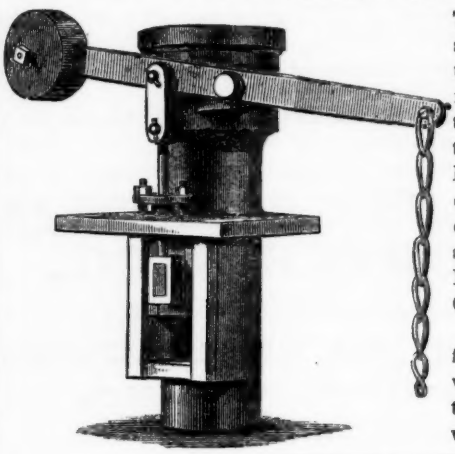
Torbay Brown.	Torbay Red.
Dart Green.	Slate.
Dart Yellow.	Buff.
Brixham Black.	Torbay Chocolate.
Light Blue.	Cream Colour.
Dart Brown.	Dart Umber.
Imperial Stone.	Light Stone.
Bronze Green.	Salmon Colour.
Navy Green.	Lead Colour.
Carriage Red.	Dark Stone.
Light Lead.	Crystal Palace Blue.
Light Green.	Iron Grey.

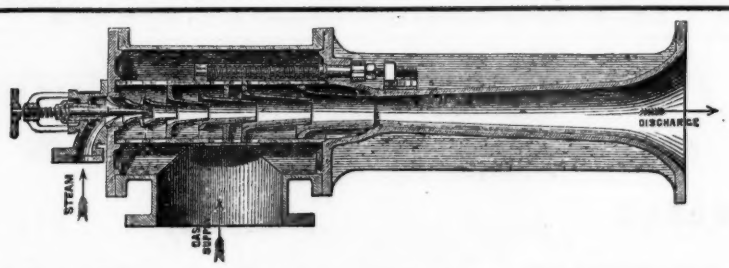
All other Colours made to order.

READY-MIXED PAINTS.
A great variety of Colours ready mixed for the brush are also always kept in Stock, in 3 lb., 7 lb., 14 lb., and 28 lb. cans.
Prices and Testimonials on application.

F. & C. OSLER,
45, OXFORD STREET, LONDON, W.
MANUFACTORY AND SHOW-ROOMS:
BROAD STREET, BIRMINGHAM.
ESTABLISHED 1807.
MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS
WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.
TABLE GLASS OF ALL KINDS.
CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

GEORGE ORME & CO.,
ATLAS METER-WORKS, OLDHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
STATION-METERS, GOVERNORS,
PRESSURE AND EXHAUST REGISTERS,
LAMP-METERS IN CAST-IRON BOXES,
And every Description of Gas Apparatus.

MOORE'S PATENT DIP-PIPE.

THE advantages of this Dip will be seen from the engraving. It is thoroughly effectual in its working, removing the whole of the pressure of the hydraulic main from the retort, thus causing a great saving in gas. It is very easy of manipulation, requiring little care and attention; it cannot get out of order, and, when shut, works as an ordinary Dip-Pipe. No accumulation of carbon in retort. Can be fixed to existing H-pipes.
In ordering the Dip, the distance from top side of hydraulic main to water-level should be stated; also the Dip at which it is required to work when the valve is shut.
PRICES—3-in., 35s.; 4-in., 42s.; 5-in., 48s.
SOLE AGENT: J. GILL, GAS-WORKS, BRIDGENORTH,
To whom all communications should be addressed.
MAKERS: THE COALBROOKDALE COMPANY, SHROPSHIRE.



KÖRTING'S STEAM-JET GAS-EXHAUSTER.
IMPROVED CLELAND'S PATENT.
UPWARDS OF 250 IN USE.
CLELAND'S PATENT CONDENSER AND STEAM SCRUBBER.
FOR PARTICULARS, APPLY TO
KÖRTING BROS.,
17, LANCASTER AVENUE, MANCHESTER,
OR TO
GERALD J. TUPP, 8, John Street, Adelphi, W.C.,
LONDON,
SOLE AGENT FOR ENGLAND AND WALES.

THE WIGAN COAL & IRON COMPANY,

LIMITED.

DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN;

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

LIVESEY FIRE-CLAY WORKS.

NEAR BLACKBURN, LANCASHIRE.

(ESTABLISHED 1835.)

ORLANDO BROTHERS, LIMITED,

MANUFACTURERS OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL: Back Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-made Retorts have now been in *actual work* nearly 1000 days, and are yet in good order. References on application.

July 2, 1877.

HYDRATED PURIFYING MATERIAL.

Samples on application.

MESSRS. SPENCE BROS., LIMITED,

Will be glad to supply the above on the most favourable terms.

PRICES ON APPLICATION.

ALSO PATENT DRY COPPERAS FOR EXTRACTING AMMONIA.

VICTORIA CHEMICAL WORKS, BRADFORD, NEAR MANCHESTER.

THE

STANDARD WASHER AND SCRUBBER.

[KIRKHAM, HULETT, AND CHANDLER'S PATENT.]

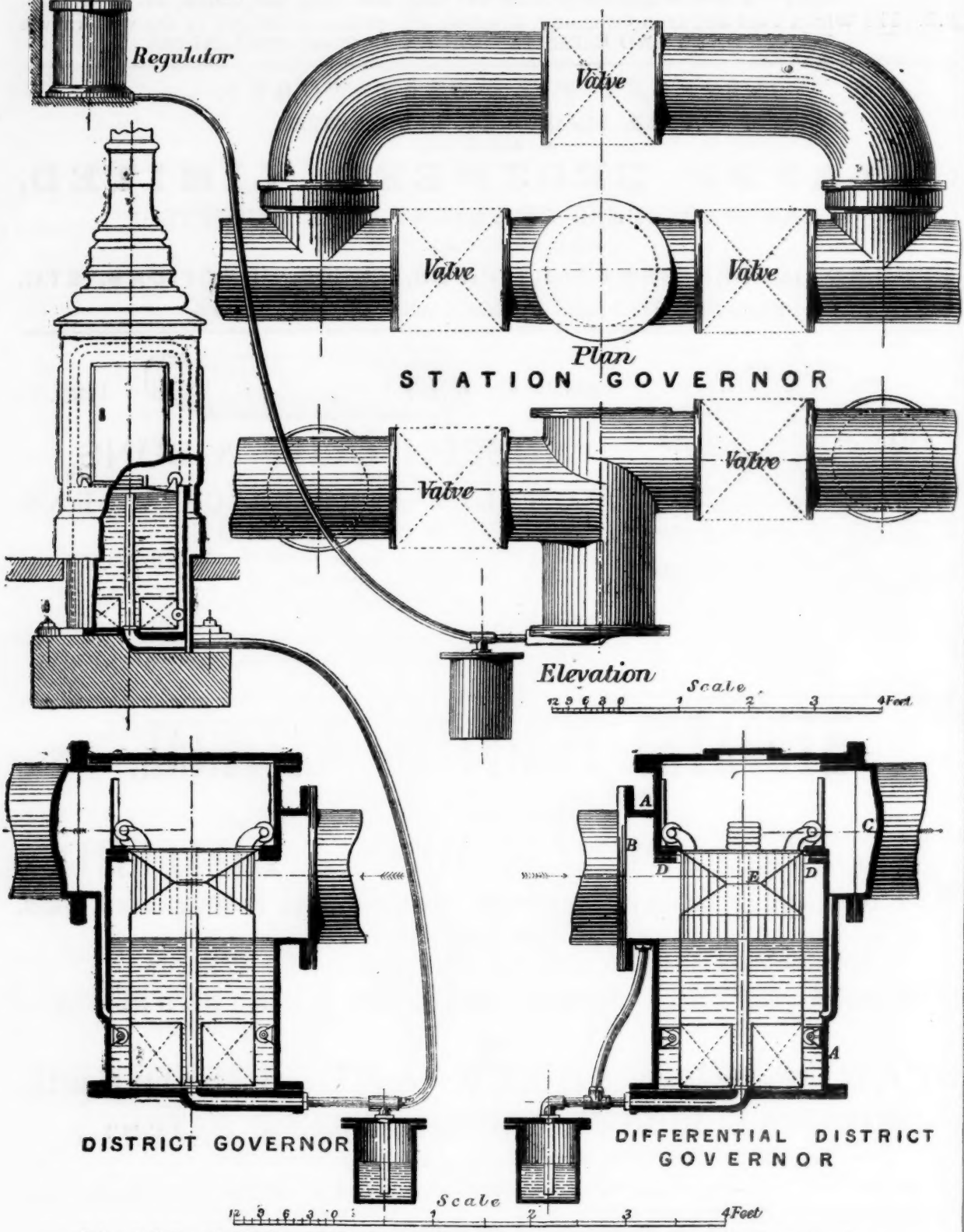
Some of the advantages claimed for this Apparatus are as follow:—

The Exposing of a large Amount of Effectually-wetted Surface (which is continually reproduced) to act upon the Gas.
Unerring Regularity in the Distribution of the Liquor.
Saving of Expense in Providing and Exchanging Scrubbing Material—none being required.
Economy of Space, thus enabling the Apparatus to be protected from the Weather.
Economy of First Cost and of Maintenance.
It works without Pressure.
It is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured.

Applications for Prices, &c., to be made to

Messrs. KIRKHAM & HERSEY, GAS ENGINEERS, 21, ABINGDON STREET, WESTMINSTER

FOULIS'S PATENT GAS GOVERNORS.



Prices (including Air-Vessels ready for fixing), delivered free at any Railway Station in the United Kingdom.

Inches	1	2	3	4	5	6	7	8	9	10	12	14	15	16	18	20	22	24	30	36	42	48
Prices	£2	£4	£6	£8	£10	£12	£14	£16	£18	£20	£24	£28	£30	£32	£36	£40	£44	£48	£60	£72	£84	£96

TERMS: 2½ per cent. for Monthly Payments. Quarterly Accounts, Net.

SOLE LICENSEES AND MANUFACTURERS,

W. & B. COWAN, LONDON, MANCHESTER, & EDINBURGH.

FOULIS'S PATENT GAS GOVERNORS.

POSITION OF GOVERNOR.—The Governors are intended to be placed underground in the line of main, but, if preferred, they may be placed above ground, and the mains led up to the Governor. The inlet-pipe is slightly under the level of the outlet.

POSITION OF REGULATING-VESSEL.—The regulating-vessel may be placed anywhere on a stool or shelf, or, for street purposes, in a lamp-post.

FIXING THE GOVERNOR.—Fix the Governor truly level; if in soft ground, place it on a flat stone to prevent sinking.

FILLING GOVERNOR WITH WATER AND OIL.—Fill the outer vessel with water to about one inch below the water-line, and fill up to the water-line with oil. Put in the bell, taking care that the valve-seat is quite clean. Put the cover on Governor.

CONNECTING-PIPE.—The pipe connecting the Governor and regulating-vessel should be of lead or block tin (iron pipe is apt to corrode internally) laid in a wooden trough, and covered with pitch or cement. Great care must be taken to have this pipe and its connexions perfectly air-tight.

SYPHON.—Fix the syphon supplied with the Governor at the lowest point of this pipe.

STOP-COCK.—Fix a stop-cock on this pipe in some convenient place near the regulating-vessel.

FILLING REGULATING-VESSEL.—The regulating-vessel should be filled with glycerine (two-fifths glycerine and three-fifths water) or oil to prevent freezing.

PUTTING GOVERNOR IN ACTION.—To put the Governor in action, shut the stop-cock on the small pipe, and fill the regulating-vessel with air, by unscrewing the plug on the top of the bell, and lifting the vessel. Open the stop-cock, and open valves of Governor; then adjust the quantity of air by allowing a portion to escape, or drawing in an additional quantity, taking care before drawing in air to shut the stop-cock. The regulating-vessel should, when the Governor is closed, be at its highest position. Weights put on the regulating-vessel will produce a corresponding pressure on outlet of Governor.

DIFFERENTIAL GOVERNOR.—When the Governor is used as a Differential Governor, the regulating-vessel is dispensed with, and the small pipe is attached to the inlet-pipe. The Governor bell is then weighted to the required difference between the inlet and outlet pressures. This difference will then be maintained under all circumstances.

These Governors will be found very useful to check the waste of gas in gas-works and public works, in which case the regulating-vessel should be placed in the counting-house or elsewhere, under the control of the manager. These Governors are now in successful operation, and samples can be seen at our Factories.

SOLE LICENSEES AND MANUFACTURERS:

W. & B. COWAN,

(ESTABLISHED 1827,)

CHURCH STREET, MILLBANK, **LONDON, S.W.** | DUTTON ST., NEW BRIDGE ST., **MANCHESTER.** | BUCCLEUCH ST. WORKS, **EDINBURGH.**

THE AMERICAN GAS-LIGHT JOURNAL.

A. M. CALLENDER & CO., Proprietors. G. WARREN DRESSER, Editor.

Issued Semi-Monthly at No. 42 Pine Street, New York City.

This Journal is especially devoted to Gas Engineering and Manufacture, and is the official organ of the AMERICAN GAS-LIGHT ASSOCIATION, and the NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

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TO GAS AND RAILWAY COMPANIES, LOCAL BOARDS, ENGINEERS, CONTRACTORS, SHIPPERS, &c.

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SOLE PROPRIETOR AND MAKER OF

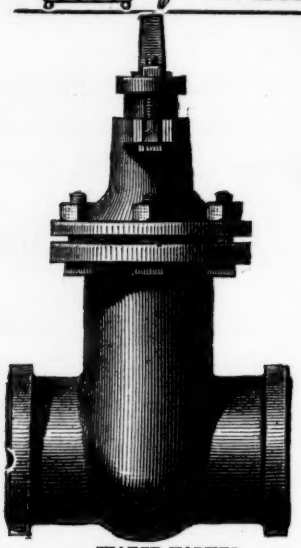
KEEN'S PATENT DOUBLE-FRAME CLIP-LAMP,

AND MANUFACTURER OF

EVERY DESCRIPTION OF STREET-LAMPS.

FOR PARTICULARS, APPLY TO

W. KEEN, 23, ROBERTSON ST., & 5 & 6, PRIORY STREET, HASTINGS, SUSSEX.



WATER-VALVES.
All Sizes, Flange and Socket, kept in Stock, tested to 1000 feethead.

SIMPSON & COMPANY,

ENGINE-WORKS,

GROSVENOR ROAD, PIMLICO,

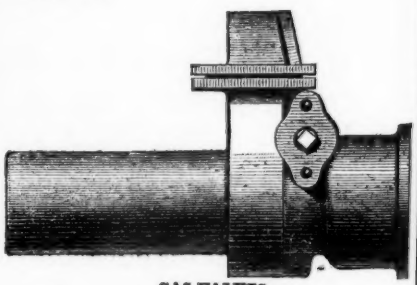
LONDON.

SCREW-COCKS, HYDRANTS,

SLUICES, PENSTOCKS,

And all other Machinery for

WORKS OF WATER SUPPLY, DRAINAGE AND IRRIGATION.



GAS-VALVES.
All Sizes, Flange and Socket, kept in Stock, tested to 100 feet head.

LIVESEY'S PATENT WASHER.

This apparatus effects the most intimate contact between the liquor with which it is supplied and the gas passing through it. The interior is fitted with an arrangement of perforated sheet-iron plates—the holes being about 1-20th of an inch in diameter—so contrived that the gas, in its passage through the Washer, has to pass through two sets of these perforations, whence it emerges in a succession of minute bubbles into the liquor in which the perforated plates are immersed. This minute division of the gas in contact with liquor results in the complete removal of all particles of tar, and it at the same time not only increases the ammonia strength of the scrubber and condenser liquor, which is all made to flow through the Washer in a constant stream, but it enables the liquor to combine with and to remove from the gas a much larger proportion of other impurities—notably, carbonic acid—than can be removed by a scrubber. This effect is due to the liquor in the Washer being kept in active circulation and in intimate contact with the gas for a very much longer period than is the case in a scrubber.

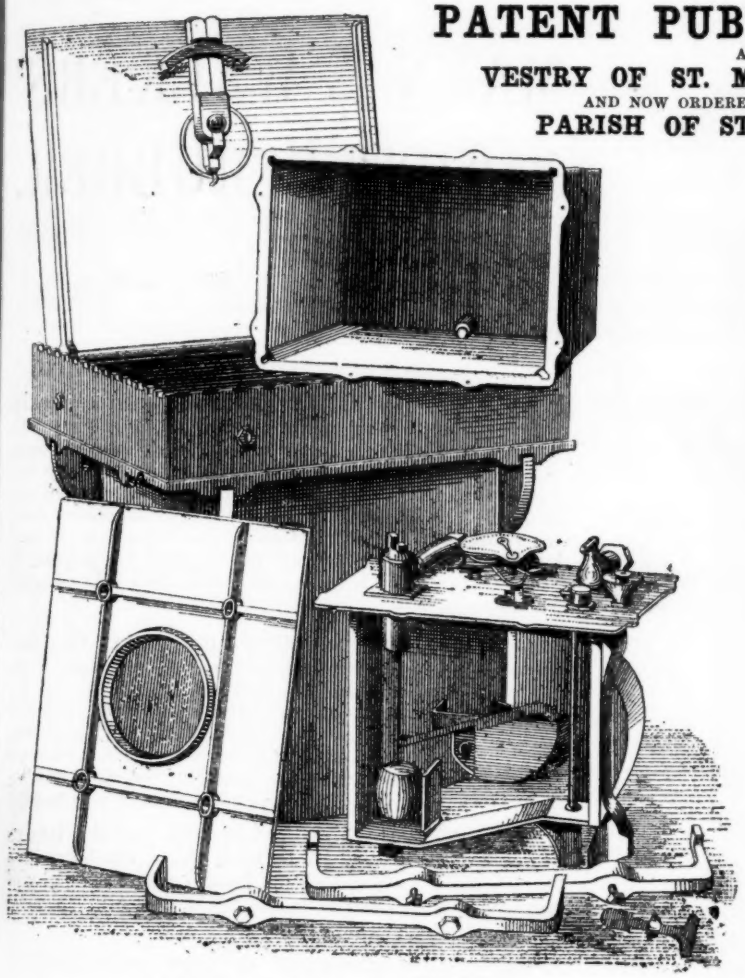
The whole cost of a Washer of this description is less than one-fourth of the cost of a scrubber of equal capacity, and although, from the fact that it is supplied with weak liquor, it will not quite remove the whole of the ammonia, it is in other respects more effective.

It has been in successful constant use for nearly three years, and examination has proved that the perforated plates neither become clogged with tar nor corroded by the action of the liquor or gases. It gives three inches of pressure, and only needs a constant stream of liquor to keep it in regular action without any further attention.

For Particulars and Prices apply to

DEMPSTER AND SONS, ELLAND, HALIFAX, for the North;
BAILEY, PEGG, AND CO., BANKSIDE, LONDON, S.E., for the South;
WILLEY AND CO., COMMERCIAL ROAD, EXETER, for the West of England and South Wales;
Or to the PATENTEE, 589, OLD KENT ROAD, LONDON, S.E.

AVERAGE METER SYSTEM.



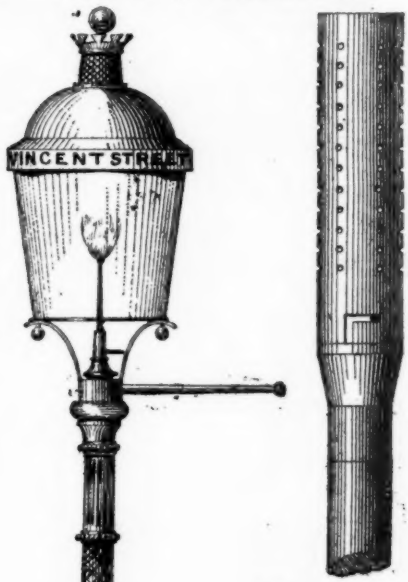
PATENT PUBLIC LAMP METERS,

AS ADOPTED BY THE

VESTRY OF ST. MARY ABBOTTS, KENSINGTON,

AND NOW ORDERED TO BE PUT IN OPERATION IN THE

PARISH OF ST. LEONARD'S, SHOREDITCH.



SUGG'S IMPROVED
LIGHTING TORCH.

SMALL SIZE
LAMP GOVERNOR,
For the inside of Lantern, with double Regulation.

WILLIAM SUGG'S
IMPROVED PATENT LAMP METER,

With adjustable Lid to suit the Slope of any Pavement.

Can be easily cleaned and repaired by any ordinary workman. Improved index and patent flexible joints. The inlet service and the connexion to stand-pipe can be cleaned out without opening the ground; the lid covers both of these. Clear glass plate on internal lid.

SUGG'S IMPROVED
LAMP COLUMN & LANTERN,

AND THE METHOD OF FIXING THE AVERAGE METER.

Note.—This kind of Meter was originally invented by William Sugg, in conjunction with Mr. Thomas Hawksley, Past-President of the Institution of Civil Engineers. They were first used at Nottingham in 1866, and are still at work. The Gaslight Company and the Corporation were both quite satisfied with the results. They were also introduced at Folkestone in 1869 by the late Mr. T. G. Barlow, Editor of the Journal of Gas Lighting. The success of the system put an end to a very long and troublesome dispute between the Gas Company and the Local Authorities. They are still at work with the same satisfactory results. They have since been used in several important towns, with equally good results.

No other kind of Lamp Meter has ever achieved so complete a success.

WILLIAM SUGG'S
PATENT PUBLIC LAMP GOVERNOR,

With Steatite Incorrodible Burners.

Guaranteed to give the greatest amount of light for the quantity of gas consumed. Nearly a Million of these, and those of William Sugg's later inventions, are in use in various parts of the globe.

MODERN STREET LIGHTING.

By WILLIAM SUGG, A.I.C.E.

Price 1s. 6d.

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Diagram showing the Curves of Sunset and Sunrise throughout the Year.

Price 2s. 6d., Litho.

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GAS ENGINEER,

VINCENT WORKS, VINCENT STREET, WESTMINSTER.

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8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

LESMAHAGOW CANNEL COAL.

FERRAND DAVIES,
148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,
SOLE AGENT FOR
THOMAS BARR'S LESMAHAGOW MAIN CANNEL.

Quotation and Analysis forwarded on application.

E. & W. H. HALEY,

General Ironfounders and Makers
OF
CAST-IRON GAS AND WATER PIPES.
Sizes 1¼ to 15 inches.

LISTER HILLS FOUNDRY, BRADFORD, YORKSHIRE.

GAS PURIFICATION.

BAILES & HALLSWORTH,
CONTRACTORS FOR THE
PURIFICATION OF COAL GAS
BY THEIR
PATENT HYDRATED PEROXIDE OF IRON MATERIAL.

The Material is adapted specially for taking up sulphuretted hydrogen, and will simultaneously absorb any ammonia that may pass the scrubbers.

The spent oxide resulting from our Material is more valuable than that from natural oxide of iron, and manufacturing chemists buy it in preference.

The Material has now been in use during the past three years in most of the principal Gas-Works in Yorkshire and elsewhere.

It contains considerably less moisture than natural oxide of iron, and is much cheaper and more efficient as a purifying agent.

B. & H. are purchasers of Spent Oxide, or will take Spent in exchange for New Material.

FOR SAMPLES AND TERMS, ADDRESS—
BAILES & HALLSWORTH, COPPERAS WORKS, ARMLEY, LEEDS.

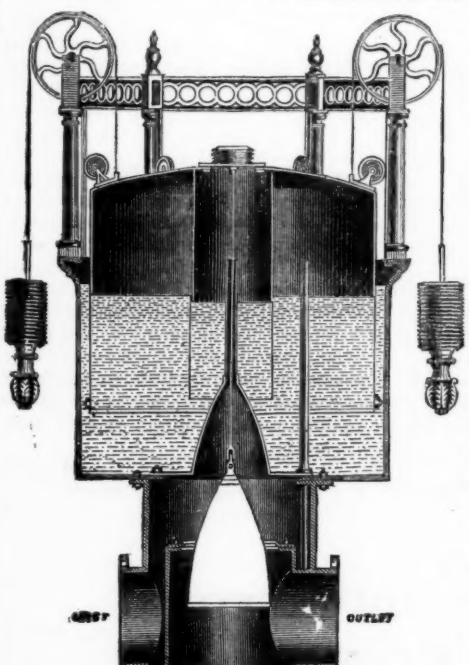
J. & J. BRADDOCK,

GLOBE METER-WORKS,
OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,
173, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.
Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,
CANNEL COAL MERCHANT,
HAYMARKET, EDINBURGH.
Established 1840.

HEBBURN MAIN GAS COALS.

T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,524 cubic feet per ton of 14¼-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

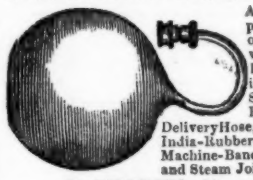
PRICES ON APPLICATION, EITHER F.O.B. OR BY RAIL IN TRUCK LOADS.

THE TYNE COAL COMPANY, LIMITED, OWNERS.
W. RICHARDSON, Fitter,
29, QUAYSIDE, NEWCASTLE-ON-TYNE.

ADDISON POTTER,

WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of
CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

CLOTH GAS-BAGS FOR MAINS,



As supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers' Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather, India-Rubber, and Gutta-Percha Machine-Bands, Sheet and Washers, and Steam Joints.

T. BUGDEN, Manufacturer,
107, GOSWELL ROAD, LONDON, E.C.

GRIRDROD'S PATENT PORTABLE PIPE SCREWING MACHINE,

For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.

In use at the chief gas-works, and giving great satisfaction.

For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.

W. H. BAILEY & CO.,
Brassfounders, Gauge Injector and Tool Makers,
ALBION WORKS, SALFORD, LANCASHIRE.

SAMUEL CUTLER & SONS,

CONTRACTORS FOR GAS AND WATER WORKS, GENERAL ENGINEERS,

IRONFOUNDERS, AND MANUFACTURERS

OF

GASHOLDERS, TANKS, PURIFIERS,

SCRUBBERS, VALVES, EXHAUSTERS, IRON ROOFS, BRIDGES, BOILERS,

AND

GENERAL CAST AND WROUGHT IRON WORKS.

S. C. & Sons undertake the entire Erection of New, or Remodelling of existing Gas-Works in any part of the World, including small Works for MANSIONS, FACTORIES, &c., or Works of the largest extent (are now constructing the largest Gasholder yet erected); also the Supplying and Laying of MAINS.

They make a speciality of supplying every requisite whatever for a Gas-Work, keeping in Stock what are most in request. WOOD SIEVES for Purifiers and Scrubbers, of a superior make.

SPECIAL CASTINGS to Drawing or Pattern at Shortest Notice.

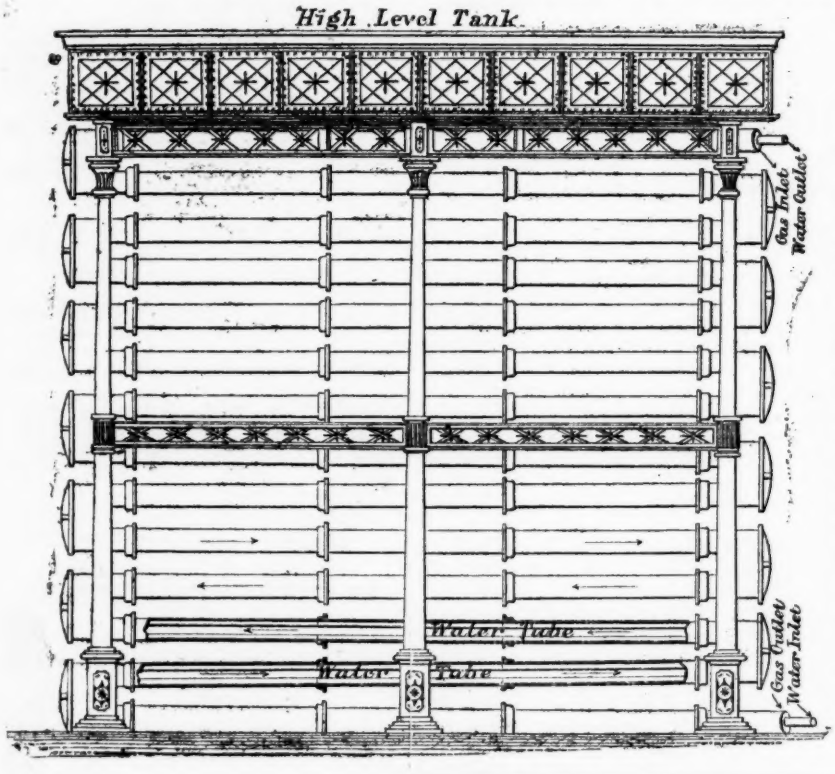
MANUFACTURERS OF

MORRIS & CUTLER'S PATENT CONDENSER

AND

CUTLER'S PATENT GAS-WASHER.

(For Illustration and Description, see "Journal" for Dec. 25, 1877, page 999.)



Description of Morris & Cutler's Patent Condenser.

The Condenser may consist of pipes arranged in tiers as shown, or in any other form most convenient to the site available, each tier being connected with special connexions, and containing within same either one or more coils of smaller pipe through which water is passed, being supplied from any convenient source of supply, the water passing in an opposite direction to the gas, so that the coldest water is at the gas outlet. The power of the Condenser can be regulated precisely in proportion to the quantity of water allowed to pass through, which is not in any way contaminated, but simply heated by the hot gas, and advantage can be taken of its being at a high level to carry it to a high-level cistern, from whence it can be used for supply to boiler or any other purpose. (The Condenser itself may form the support for a high-level cistern as illustrated.) By an arrangement of valves the water may be shut off, and an air orifice opened, when air will pass through instead of water, or both air and water can be shut off. The power of the Condenser is, therefore, entirely under control.

The Condenser may be seen in operation at the Brentford Gas-Works.

For further Particulars, apply to

Mr. F. MORRIS, GAS-WORKS, BRENTFORD,

OR TO

S. CUTLER & SONS,

PROVIDENCE WORKS, MILLWALL (Near the Steamboat Pier), **LONDON, E.**

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

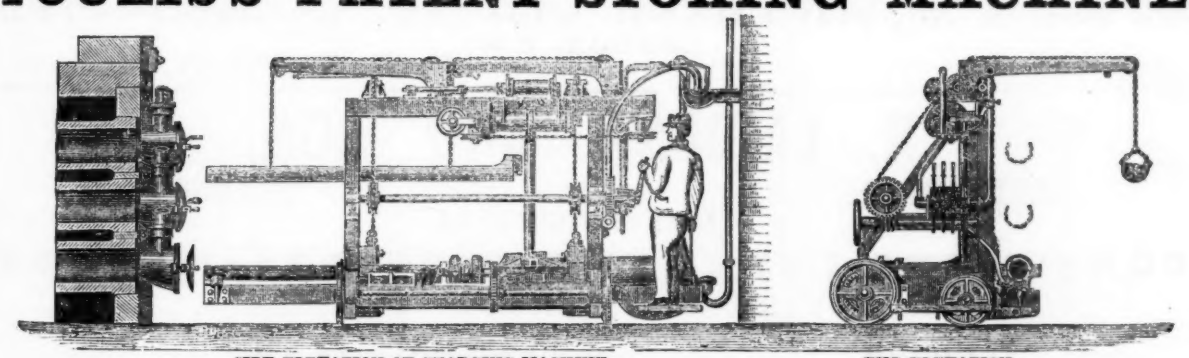
Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF CHARGING MACHINE. END ELEVATION

(The Drawing Machine will be Illustrated in next week's Advertisement.)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz; Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

"*Warrington Gaslight and Coke Company,*
Offices, Mersey Street, Warrington, April 23, 1877.

"MESSRS. NEWTON, CHAMBERS, AND CO.,

"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

"The average of Nine samples gives a yield of **12,500** cubic feet of **15½**-Candle Gas, being equivalent to **664** lbs. of sperm per ton, and **1420** lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

"Yours truly, "JAMES PATERSON."

Full particulars will be sent on application to us—address as above.

NEW PATENT WET GAS-METER,

THE "RELIANCE,"

MANUFACTURED BY THE

GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.

The object attained by this invention is the *correct measurement of Gas under every fluctuation of the pressure.*

Accuracy is obtained by subjecting the whole of the water which determines the measuring chambers of the drum to one uniform even pressure, and so prevents unequal displacements of the water-line.

The "RELIANCE" METER has been tested by several of the most experienced official meter inspectors. Copies of their reports may be obtained on application to the

GAS-METER COMPANY, LIMITED,

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MR. A. VERNON HARCOURT'S COLOUR TESTS,

FOR BISULPHIDE OF CARBON, SULPHURETTED HYDROGEN, AND CARBONIC ACID IN COAL GAS.

The demand for these instruments since A. Wright and Co. have had the manufacture and sale in their hands, has been so great as to necessitate their production in the same form generally as that of the model furnished to them; but improvements, which some time since received the approval of Mr. Harcourt, have been made, which render the apparatus more compact and convenient in several respects. The new form will also, when required, be made, *at extra cost*, with platinum instead of with glass bulbs. Drawings and particulars will be shortly ready. In the meantime, the instrument sent out will be as described in Mr. Harcourt's instructions, a copy of which will be sent per post on receipt of 2d. in stamps.

ALEXANDER WRIGHT & CO.,

GAS-METER AND APPARATUS MANUFACTURERS,

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LONDON, S.W.

F. W. HARTLEY, Manager.

R. LAIDLAW AND SON,

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Manufacturers of

CONSUMERS IMPROVED WET GAS-METERS,

THE UNVARYING WATER-LINE GAS-METERS,

IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

Experimental Meters, Photometers, Pressure-Gauges,

Governors, Test Holders, &c., &c.

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JOHN ABBOT & CO., LIMITED,

MANUFACTURERS OF

IMPROVED

HYDRAULIC CRANES & HOISTS,

Effecting an IMMENSE SAVING in the cost of discharging Coals from Vessels, Barges, &c.

HYDRAULIC RAMS FOR LIFTING AND LOWERING PURIFIER COVERS.

GAS PLANT GENERALLY, PIPES, ROOFING, TANKS, &c.,

PARK WORKS, GATESHEAD.

LONDON OFFICES: 2, SUFFOLK LANE, CANNON STREET, E.C.

GLASGOW OFFICES: 54, ST. ENOCH'S SQUARE.

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